Engineering News, December 14, 1961

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No. 11 December 14, 1961

THE NEWSPAPER OF INDUSTRY • A HEYWOOD PUBLICATION

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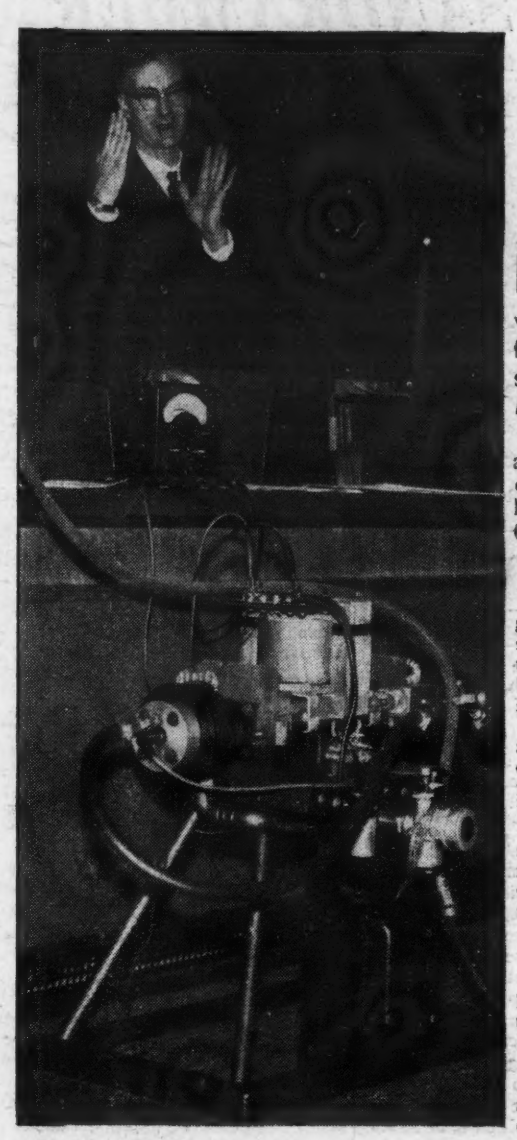
# MHD GENERATOR COULD BE WORKING WITHIN 10 YEARS



Professor Thring demonstrates a linear generator (foreground) which uses an aluminium slug alternating between two compression chambers at high velocity through a magnetic field. Possible adaptations to a form of m.h.d. could be to use an alternating fired shock wave on similar principle to the gas unit. Unit could have applications as a light portable generating set of simple construction.

## I.E.E. lecturer demonstrates test model

**FIVE years ahead with ideas but ten years behind in terms of money was how Britain's position in the field of magnetohydrodynamics research was summed up by Professor M. W. Thring in London last week.**

Prof. Thring, Professor of Fuel Technology and Chemical Engineering at the University of Sheffield, was at the Institution of Electrical Engineers to lecture on magnetohydrodynamics (m.h.d.) at the Parsons Memorial lecture.

### Efficiencies of 60 per cent

With this direct method of electrical power generation efficiencies of 60 per cent were considered possible. Compared with conventional turbogenerator systems m.h.d. generators would have a higher reliability and be cheaper to construct.

With m.h.d., he said, everything gets better as the unit gets bigger. Some 1,000 volts d.c. could be produced per metre of width across the field and with increasing size the enclosing surface would be subjected to less heat.

Although m.h.d. produced d.c. current, conversion to a.c. generation could be done by several means, and the additional cost involved would still enable a unit to be produced more cheaply than by present conventional systems.

### Many problems still ahead

Prof. Thring said there are still many problems to be solved but he suggested a plant using this system could be produced and working within ten years.

The process known as m.h.d. is simple in principle. It consists of heating up a gas to about 2,000°C which ionises it by stripping off electrons from the atoms.

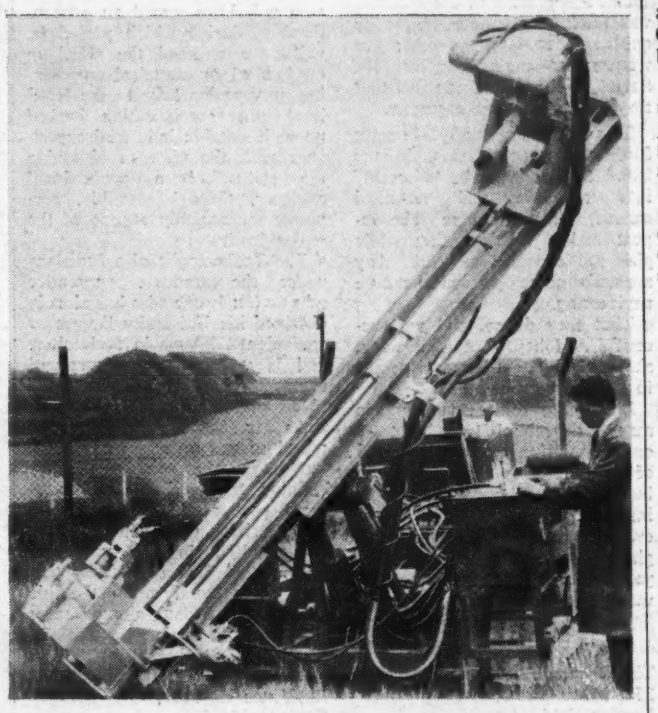
This plasma is expanded through a nozzle, which accelerates it to a high velocity, where it passes through a region of transverse magnetic flux provided by an electro magnet.

The magnet separates the ionised particles of the gas on to electrodes which in effect become the terminals of a generator. The output is direct current.

Addition of small amounts of materials such as potassium, having low ionisation potentials, are said to give the heated gases the required conductivity.

Experimental generators on this principle have been made in America and one type was shown by Prof. Thring at the institute.

## Crawling drill rig is developed in London



A SELF-PROPELLED drilling rig which can cope with normal and specialised work has been developed by the Reichdrill Division of the Consolidated Pneumatic Tool Co., of London.

In addition to general blast hole work, the drill is suitable for specialised work such as deep drilling for grouting or for anchorages in hard rock or concrete in addition to prospecting in alluvium, and for well boring when used with a 6in. diameter casing.

The drill has a hydraulically operated variable speed drill rotation motor and a variable hydraulic thrust mechanism for use with either an in-the-hole hammer for blast holes of 4½in.-5in. dia. or a rotary bit for holes of 2½in. dia. in hard formations and up to 6¼in. dia. in soft rocks and alluvium.

The drill is powered by a Ford Dexta three-cylinder diesel engine developing 25b.h.p. at 1,450r.p.m. Alternatively a Sutton Power Pack may be fitted.

● back page, col. 6

## Improved cells step up output

SUCCESSFUL development of a modified type of aluminium reduction cell utilising refractory hard metals as essential elements is announced by the British Aluminium Co. of London and Kaiser Aluminium and Chemical Corp., of California, U.S.A.

The two companies, who undertook the development jointly, consider it to be of major commercial significance and claim it can substantially reduce production cost per pound of aluminium and permit expansion of the capacity of existing facilities with relatively small capital expenditure.

### Basic change

Cells with these new cathode materials are said to offer the first basic alteration to the electrolytic reduction process since its invention 75 years ago.

The development, it is claimed, can lead to an improvement of up to 15 per cent in cell operation which can be achieved either by a decrease in the energy consumption per pound of metal, or by an increase in metal output per pot.

Further details of the development are to be given in a paper to be presented at the International Symposium on the Extractive Metallurgy of Aluminium. This will be held by the American Institute of Mining and Metallurgical Engineers in New York during February 1962.

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## FORK LIFTS REPLACE CRANES

FOR a key handling operation in their new Glasgow Clydebridge development, Colvilles are to use heavy duty Towmotor Monarch fork trucks with a lifting capacity of 24,000 lb. These will permit extensions to the mill without the installation of extra overhead cranes.

The diesel-powered Monarchs will handle ten-ton billets of red-hot steel, carrying them 200 yards from slabbing mill to cooling bay.

Features of the Monarch include its speed of 23 m.p.h., power steering, and extra-high ground clearance.

## Industry research

*INDUSTRIAL Research in Manufacturing Industry 1959/60, an important report prepared by the Federation of British Industries and the National Institute of Economic and Social Research is published today.*

*The report (2 gns.) draws a detailed picture of the lines of research, of the relationship of research to growth, and of the significance of Government contracts. Engineering News will cover the survey fully next Thursday.*

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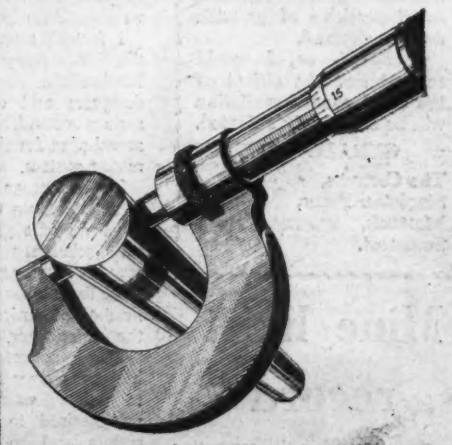

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## Letters to the Editor

# RESPECT ACADEMIC STATUS

## Continental reader puts technician 'in the right perspective'

HAVING recently looked into the topic of "status and the Technologist" I may be able to supplement any of your own comments you may have on this subject. My views, I believe, represent the Continental opinion in addition to those held in the U.K.

The titles "Technician and Technologist" have long since existed in industry and are not new "gimmicks" which A. Weyland Smith appears them to exist as.

There are of course many other categories which have given birth since the war and which appear to be officially or otherwise excepted as a means of designation in the various trades, but the two ranks referred to above embrace the subdivisions from which the well-worn and apparently indistinctive word "engineer" should be applied more meaningly.

To summarise as briefly as possible, I have included a definition of Technician in order to spotlight the right perspective of the term Technologist.

Technician is one who is concerned with technical matters, within, of course, certain specified conditions; for example, a technician in the drawing office would be responsible for redesign, modification and replanning on machinery or equipment already tested and in current use. This man will have served an apprenticeship, during which period he will have attained the ONC in mechanical or electrical engineering, progressing later to the HNC level, plus specialisation backed up with suitable industrial experience with the view to obtaining the status of a professional engineer, through possibly, corporate membership of one of the senior institutes.

The Technologist also functions under the graduate apprentice scheme but is one who has already obtained his University Degree or equivalent Diploma in Technology and is undergoing a course of management practice, with the object of taking up a senior post.

As Mr. Smith says, let us be proud to call ourselves engineers, but let us be prouder still by defining the level of our status from past academical work we have strived to attain and not be engulfed in the vast and complicated field of activity that assumes to loosely apply the title "engineer". Today's circumstances did not exist during the days of Brunel and Stephenson!

**A. H. SEPPINGS**

Residence du Parc,
Franconville, France.

## Greeks had a word for technologist

A. WEYLAND SMITH asks "What exactly is a technologist?"

Its derivation from the Greek "tekhne" — manual skill or art, and "logos" — speech, suggests that it is someone who is skilled in the language and learning of the practical arts.

Its adoption in the titles of University Colleges and Colleges of Advanced Technology would suggest that even if it was once status terminology it has now come of age.

It is interesting, also, to note the derivation of the word "engineer." At first sight this is easy, an engineer is someone who tinkers with engines. This is not very flattering, and is no better than the "manual skill" mentioned previously.

The true derivation, however, is from the word "ingenious," thus an engineer is an "ingenious person"—one who contrives, designs or invents. It is only since the 16th century that the word has assumed the form engineer.

Going one stage further, from the Latin "ingenium" — an ingenious person, or an invention or clever thought, we have the derivation in its proper perspective.

Technologist? Engineer? In the rhetoric of Shakespeare, "What's in a name?"

J. R. CROOKALL,

Imperial College of Science
and Technology,
S.W.7.

## RUSSIAN GIRLS NOT DIRECTED

I HAVE read with interest the article "Do women make good engineers?". Since the report on Women Engineers in the U.S.S.R. was published, I have frequently quoted the large number of women in engineering in the Soviet in support of the fact that they do make good engineers.

This has repeatedly brought forth the response that, in the U.S.S.R. girls must be "directed" into scientific and technical careers. This is not so. The report makes it clear that while girls are expected to work, they are under no compulsion to choose engineering.

That they do so, and are successful and happy in their work, should be brought home to people in this country.

Inadequate science teaching in many girls' schools is undoubtedly one reason for the small number of girls entering the engineering industry here: however, in most instances, the profession is not even given a thought when a girl's future is being considered, yet it offers a worthwhile and rewarding career.

**MARGARET K. BRIGGS**
**Hon. Press Officer**

The Women's Engineering Society,
25 Foubert Place,
London, W.1.

## EQUIPMENT CLEAN ROOM

**I would like to draw your attention to the photograph on page 20 of the November 2nd issue of Engineering News concerning the clean room technique at Bristol Siddeley.**

**Is it not possible that the chains being used to lift the gas bearing circulator into position are, through friction wear, allowing small particles of metallic dust to descend.**

**If this is so, I would suggest that the object of the clean room installation will be completely defeated.**

**GERALD A. BUSH**

**The Caravan,**
**Stapleton Farm,**
**Martock,**
**Somerset.**

## Mine hoist record

I was interested in the contention in your November 30th issue that the Western Deeps 6,100-ft. hoist, built by a Swedish firm in South Africa, constitutes a record.

The Gifford's shaft in the Champion Gold Mine in Mysore, India, has a vertical depth of 6,584-ft.

**N. D. McWHIRTER**

22 Chancery Lane,
London, W.C.2.

## Common Market entry forces metric issue

IN recent weeks the case for the adoption of the metric system of measurement has been discussed in your columns with points of view both for and against.

I feel that with the advent of the U.K.'s entry into the Common Market the time has come for designers and engineers to give serious consideration to fixing a sound plan for the adoption of the metric system.

To encourage this idea a lead is needed from the government in the form of a graduated introductory scheme with legislation to provide compensatory help to those firms whose equipment would need to be entirely replaced under the changeover.

The introductory scheme should be spread over two or three years to allow workers to become acclimatised to using the metric system and to avoid making a good deal of useful equipment obsolete.

Although it is possible to use machine tools with English measuring constituents it is far from a satisfactory solution. Production engineers will no doubt agree that one of their best aids to production is standardisation and it must be obvious that if we want to expand our machine tool exports to the Common Market member countries that we should all adopt a common system of measurement.

As the metric system is universal throughout these member countries then it is surely logical to assume that this would be the best system to adopt.

How many engineers have not at one time or another been frustrated by the antiquity of our present measuring system, where: 12 in. = 1ft., 3ft. = 1yd. and 1,760 yd. = 1 mile, etc. How much easier it is to resolve all measurements in multiples of ten.

The adoption of a new system of this type is bound to meet with a certain amount of opposition, particularly from engineers of the old school, but in the interests of promoting our prestige abroad we should not delay too long over this matter.

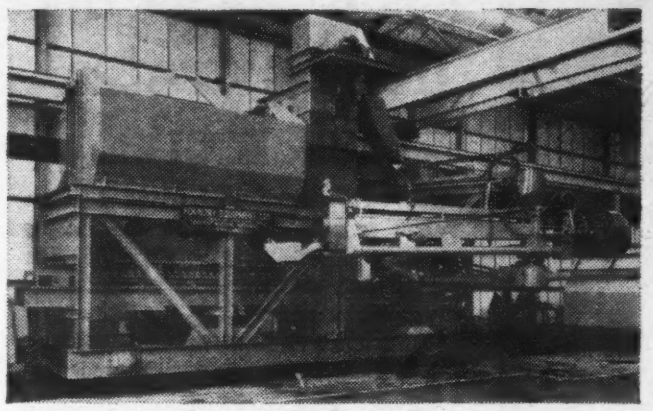
The aircraft industry has for some time now demonstrated the futility of using fractions by dimensioning their drawings in inches and tenths, which is perhaps half way to solving the problem.

**K. J. KEDGE**

15 Newcroft Close,
Hillingdon,
Middlesex.

"I put my fag down"

# HIGH OUTPUT SANDRAMMER


This large mobile sandrammer can deliver 2,000lb. of sand a minute from the end of a 22ft. arm.

THE new foundry and works of Walmsleys (Bury) Ltd., which opened at the beginning of this month at Bolton, is equipped with the largest sandrammer made to date by Foundry Equipment of Leighton Buzzard. This machine can project up to 2,000lb. of moulding sand per minute from the end of a 22ft. long swinging arm and is mounted on rails to enable it to travel along the moulding shop floor.

Both arms of the Sandrammer are actuated by hydraulic rack and pinion torque units. Speed of arm movements are controlled from the operator's seat through flow valves by means of a joystick control at the head of the machine. Two adjustable spotlights are provided to assist the operator as the moulds are being filled.

The sand is fed from the removable hopper by a belt and bucket elevator, along the front and rear arms by belt conveyor and thence to the twin-bladed impeller, powered by a 75 h.p. electric motor, which throws the sand.

The degree of compacting of the sand in the mould can be controlled by changing the speed of the impeller motor from the operator's position during the ramming operation. The sand output can be varied between 1,200 and 2,000 lb. a minute.

The amount of sand rammed is determined by a hydraulically operated gate on the hopper. A by-pass chute and plough are fitted to enable loose sand to be diverted over the pattern before the high density ramming takes place through the impeller head.

The weight of the complete unit including spare hopper and ballast, without sand, is about 27 tons. With detachable hoppers, one hopper can be in use whilst the other can be taken by crane to the sand preparation bay for filling.

Electric power can be taken to this mobile unit either by means of a heavy duty cable running from a drum situated at the rear of the unit or by means of a current collector and bus-bar system.

# AUTOMATIC LINE BLANKS TRANSFORMER LAMINATIONS

AN automatic production line which cuts out laminations for distribution transformers from coiled strip recently installed at Ferranti's West Gorton, Manchester, works is approximately three times faster than a pilot unit built some three years ago for the same operation. The pilot line has a maximum feed rate of 40ft./min. while the new line can handle 120ft./min. or more.

Design and construction of the line was by Humphris and Sons of Poole, Dorset. It will produce conventional core and mitre laminations from 3¾ in. up to 72 in. in length, and from 1½ in. to 10 in wide.

The line comprises a control cabinet; a loop control unit; a decoiler; a feeding and measuring machine incorporating pinch rolls measuring rollers, entry and exit guides; a Humphris open front press of 25 tons capacity; and a run-out table and stacking unit for the finished laminations.

### Air flotation

A feature of the oscillating press tool, which is fitted with tungsten carbide shear blades, is that air flotation is used to assist angular movement through 90 deg. for alternate 45 degrees. mitre cuts.

On the original pilot line, a perforated disc with 120 holes is mounted at one end of the combined feeding and measuring rollers. A light beam is directed through the disc at a photo-electric cell and one interruption of the light beam corresponds to 1/64 in. feed. Pulses from the cells are fed to a dekatron counter unit incorporated in the control panel.

For the new line a positional control servo system has been developed jointly by Humphris and Sons and Laurence, Scott and Electromotors of Norwich. As the strip material is fed to the press it passes between a pair of measuring rollers which drive a two-lobe cam through a reduction gearbox and reversing clutches.

### Length setting

A 3 h.p., d.c. motor drives the feed rolls and this forms part of a Ward Leonard system. It continues to run until the cam has turned the magslip to the point where it gives zero output. The cropping tool is then operated, clutches reverse, and the cam is driven in the opposite direction, with the strip still moving forward, until the other lobe on the cam brings the magslip to the zero output position again. Provision is made for adjusting the distance between the lobes of the cam, and this setting controls the length of strip between cuts.

After cropping, the laminations are carried by a conveyor belt to the stacking unit which has two hinged doors forming a run-out table. A micro switch actuated by the laminations themselves opens the doors by means of an air cylinder and allows them to fall on to a pallet.

### Coil loading

Coils are mounted on a mandrel which is driven by a variable speed a.c. motor through a reduction gear and electro-magnetic clutch. An electro-magnetic brake controls overrun.

When a new coil has been loaded the material is inched from the reel and threaded under a control arm and into the feeding machine pinch rollers. The side guides are then set to suit the material width and the coil unit switched to automatic operation, a photo-electric cell controlling the size of the reserve loop.

Following this the measuring rollers of the feeding machines are engaged, the required length of strip selected on the control panel, and setting up is completed.

## NEXT WEEK

SURFACE Grinding Machines. Mr. C. Kenward, Engineering News machine tool correspondent, examines the design improvements brought about in surface grinding machines by the demand for a high degree of accuracy and rapid rates of metal removal.

Northern Ireland and the Common Market. A great deal of governmental and industrial activity has been put into the progress of Ulster since the war.

For the final article in the series on British industrial centres and the prospects in the Common Market, Engineering News visited Belfast

# Justifying reduced product life

ARE you interested in starting controversy? If so, just suggest that American industry follows the principles of "planned obsolescence".

In the face of annual model changes it is difficult to believe that this practice could be effectively denied—yet there are those who will try. Such a suggestion is considered close to an "act of the devil".

The viewpoint of engineering or technically trained personnel does not generally agree closely with that of sales orientated management.

### No set product life

The technical man tends to declaim any attempt to limit or set finite product life. The sales-orientated man can offer quite plausible, on the surface at least, rationalisations on the benefits derived from this practice.

It is doubtful whether the question has a concrete answer. On the one hand even the best technical designer cannot accurately predict the exact life span of every component he uses. He may therefore be practising the principle of "planned obsolescence" without being aware of it.

This same indeterminate factor also prevents the devoted practitioner from being able to establish an accurately determined product life span.

The prime arguments offered by proponents of planned product life are the ability to develop volume markets before saturation is reached, and the customer benefits derived from design improvements incorporated in newer models.

### Management decisions

By the same reasoning additional research and development can be supported by the additional revenue generated by added market activity.

One proponent of this concept states: "Planned short term product lives must necessarily be management decisions. Should engineers resist such a philosophy ?"

He continues: "Astute marketing analyses and mature management decisions on planned existence spans of products may well become one of the greatest economic boosts to the American economy since the origination of time-payments."

This opinion is shared by a relatively few people in American business. Indeed there are many who do not share completely his somewhat optimistic viewpoint on time-payments.

Engineers should and generally do resist attempts of "ivory-tower" management men who feel that short product life is a desirable method of artificially stimulating markets and consumer spending.

The business cycle is to some degree a full circle, but it is not made to turn faster by the mere addition of more spokes to the wheel.

We are surrounded by products whose lives have been unintentionally limited because of a single component's failure. It is almost impossible to design a complex machine or product which will be serviceable for x years and no longer.

We accept these products with only minor irritation—unless we suspect the failure was preplanned. In that event righteous indignation is expressed on all sides.

Who is to decide what short-term life means ? Is a product which has served a short, highly useful lifetime at a satisfactory cost necessarily wasteful ?

### Unintentional limit

Shortened product life appears acceptable if competition forces the change, such as a materials substitution, or if for any other competitive reason skimping is required. Acceptable that is, as long as it isn't identified as product death-date planning. It would seem that we can do things in ignorance or in meeting competition that are not permissible for any other reason.

The folly of the situation is that the designer who insists his product design is the best that can be made is generally fooling only himself.

There is not a product on the market today that could not be improved by using the properties of more expensive materials and characteristics of more advanced designs. Every design is a compromise.

### Value received

The designer selects a desired level of service or performance and develops a product that meets this degree of service. This service level, when considered with the frequency of use and the time period of its use gives the sum value received.

Surely then it cannot be so wrong for a designer to be cognisant of the results of his decisions and selections and to make the necessary compromises accordingly.

No, remove the rancour and heat of discussion, and he is filling in an essential dimension—time—when designs are tailored to perform for a specified period of time.

This is the only legitimate reason for product life planning — to match value received and cost.

# GOVERNMENT MUST SPONSOR NUCLEAR MARINE ENGINES

## *Development of a single design urged*

ACTION is needed now unless Britain is to be the last seagoing nation to have nuclear propelled ships. So far, the Government has failed to give adequate support. This was the condemnation with which Captain H. F. Atkins of Vickers Nuclear Engineering introduced his paper on "Nuclear Propulsion of Ships" to the Institute of Nuclear Engineers last Friday.

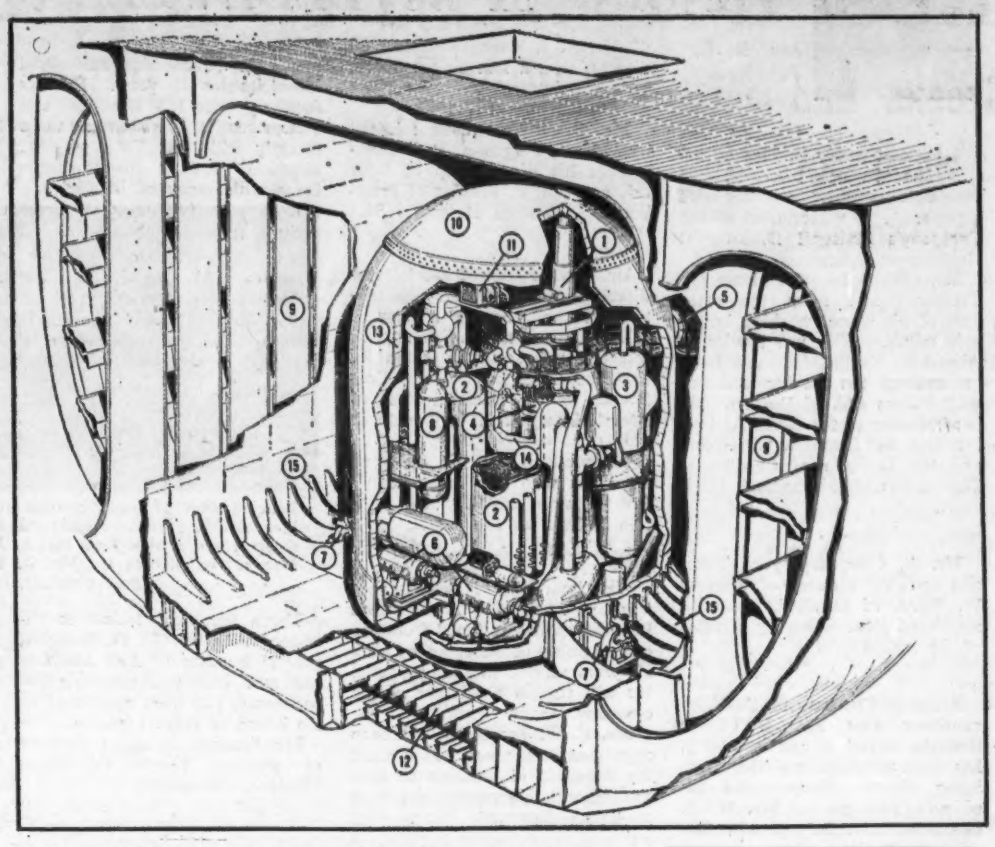
Furthermore, he did not consider that the U.K.A.E.A. was capable of undertaking such a development, it needed the efforts of engineers who had been to sea and understood the problems involved. The Government should give the task to industry through a programme drawn up by the Ministry of Transport and the Admiralty under the Minister for Science.

### Rolls-Royce design

At least £20 million should be voted now for use over the next five years to develop a steamed-cooled heavy water reactor to the Rolls-Royce design, and to install a prototype in a fast fleet tanker.

This type of reactor has been developed entirely for sea use and will give steam of a quality which allows turbines to have the best thermal efficiency.

Some 7 per cent of the reactor heat is lost to the moderator. Primary steam is circulated by a thermo-compressor using an improved Loeffler cycle. Neutron economy is high, because cold heavy water is the best moderator, and no reactor pressure vessel is necessary which gives flexibility in design.




**Steam cooled heavy water reactor for ships. Key: 1 charge machinery; 2 primary steam generator; 3 secondary steam generator; 4 reactor; 5 air lock; 6 feed pumps; 7 feed pump turbine; 8 steam drum; 9 collision protection; 10 containment; 11 containment cooler; 12 reinforced raft; 13 secondary shielding (12in. concrete); 14 primary shielding; 15 containment supports.**

Control, scram and flux flattening are achieved by filling and emptying cold moderator tubes at atmospheric pressure.

Seaworthiness is even better than in the pressurised water type reactor because there are no control rod mechanisms, no massive reactor vessel. Nor are there moving parts or accurate clearances inside the reactor or thick primary circuits with pumps, except for feed water.

The feed water, being evaporated in a once-through boiler, leaves its solids in a separate drum so that the system is well suited to the direct cycle in a ship with its almost inevitable salt leaks.

Although the call from Captain Atkins for immediate and unstinted action found much sympathy in his audience, there was not the same degree of support for his plea to put complete faith in one design of reactor.

Research undertaken by various firms on boiling water, organic moderated and gas-cooled reactors should not be ignored and it must be remembered that the pressurised water type had been proved for submarine use.

# PLASTIC FOAM SEALS RUDDERS

ONE of the less spectacular but potentially important uses of rigid polyurethane foams is for filling ships' rudders. The benefits of such filling in terms of greater stability through prevention of ingress of water and protection against internal corrosion have been known and appreciated for some time, and several rudders have been filled successfully over the past few years.

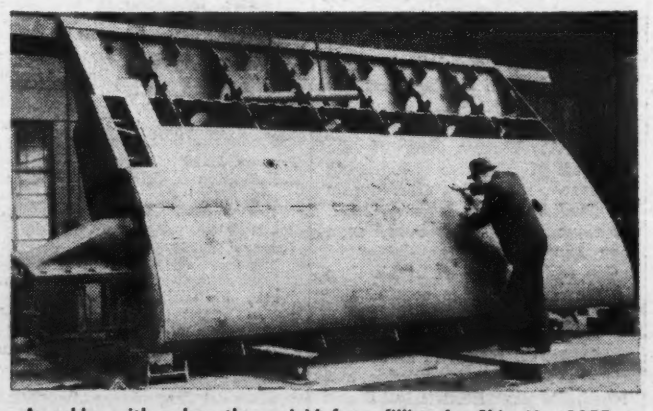
The recent development, by ICI Dyestuffs Division, of Daltolac 41/Suprasec D/Arcton 11-based polyurethane rigid foam, and the availability of better and less cumbersome dispensing equipment, has made the filling operation a much simpler and more economic proposition.

In this newer system the Arcton 11 (trichlorofluoromethane) supplements the blowing action of the carbon dioxide, giving much lower-density foams of high closed cell content.

### Filling trials

Some interesting trials of ships' rudder filling were recently carried out by technicians of ICI Dyestuffs Division working in conjunction with an experienced firm of insulation contractors. In these trials the Daltolac 41/Suprasec D/Arcton 11 system was used, the foam being dispensed by means of the Mark II metering unit and the Mark V dispensing gun.

The results showed striking improvements over those from trials with earlier polyurethane foam systems. The cost of filling and the time required for the work were reduced substantially and a suitable sequence of filling stages or "lifts" was established, along with the best method for handling the rudders and the dispensing equipment.



**A rudder with polyurethane rigid foam filling for Ship No. 1255 now under construction by Smith's Dock Co. It was fabricated by Colvilles Ltd., Cambuslang.**

# Data plant for AEU

THE new headquarters building of the Amalgamated Engineering Union, situated in Lyndhurst Way, Peckham, S.E.15, was opened on Tuesday by the Union's president, Mr. W. Carron.

The building's ground floor is specially strengthened to take heavy data processing machinery. It is claimed that this will be the first time that any union in this country has made use of such equipment.

The site of the new three-storey HQ is next to part of the old union building and connections have been made to allow access between the two. Cost of the new building was £115,000.

First and second floors are devoted to offices with 3,00 sq. ft. of space each.

# *Lathe firm beat clock*

A TELEPHONE order from a Canadian firm for a standard general purpose lathe was received by Willson Lathes of Halifax on Friday 1st December. The unusual feature of this order was that it stipulated that the machine had to be in operation in Newfoundland within one week.

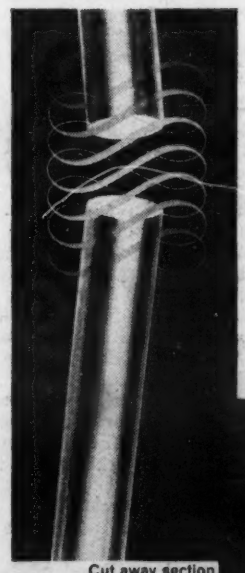
The machine was completed the following Wednesday and put on an overnight plane for delivery the following day so that it could be installed and ready for work by the Friday morning.

# COARSE-FINE LEVEL GAUGE

Coarse-fine indication by means of a gauge with two needles—rather like a clock dial—is a feature of the new Whessoe double Synchro 50 tank level transmission system.

The two-needle gauge, which is made by Ketay Ltd., gives readings in feet and inches or in metres and millimetres, and measurement is accurate to within ± 0.05 in. or ± 1 mm.


**METASTREAM improves power transmission**



Cut away section of Metastream 'M' Series Coupling.

Metastream couplings will deal with angular and lateral malalignment and a combination of both.

The maximum amount of malalignment will depend upon the drive and conditions. Angular displacements of up to 2° and lateral differences of up to 0.3" can be accommodated. Metastream couplings are all metal, *do not require lubrication*, provide axial flexibility and are torsionally rigid, and cost little more than ordinary couplings. The only entirely satisfactory method of direct coupling is by

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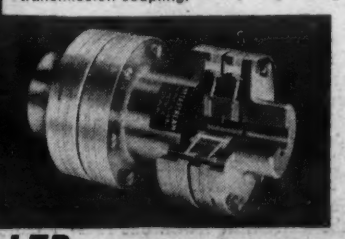

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P.6682

# BAKER PERKINS APPOINT MR. R. E. PURDHAM CHIEF ENGINEER AT BEDEWELL

Mr. R. E. Purdham

A SENIOR position has been filled at Baker Perkins by the appointment of **Mr. R. E. Purdham** as chief engineer and member of the executive of the Company's Bedewell Division at Hebburn-on-Tyne.

Mr. Purdham was born in Transvaal and spent the early part of his career working in the gold mines. After war service in Abyssinia, North Africa and Italy, he entered the baking industry with Bakers Ltd. of Durban. He is a member of the South African Institute of Electrical Engineers and the Institute of Certificated Electrical and Mechanical Engineers.

☆

**Mr. A. Carr,** deputy chairman and assistant director of Thomas W. Ward, of Sheffield, has been appointed joint managing director of the company.

☆

Richard Thomas & Baldwins announce that **Mr. J. Idris Roberts,** director and secretary, has been appointed assistant managing director (finance and administration). **Mr. W. F. Gilbertson,** director and controller of production, has become assistant managing director (production).

☆

The General Electric Company have announced the appointment of **Mr. A. J. Scamp** as personnel director with a seat on the board. This appointment will take effect as from January 1, 1962.

Mr. Scamp has been released by Massey-Ferguson and relinquishes his directorship of both this firm and F. Perkins of Peterborough, as from December 31.

☆

**Dr. Sigvard Eklund** has become director-general of the International Atomic Energy Agency.

Dr. Eklund, a Swedish nuclear scientist, was secretary-general of the Second United Nations' Conference on the Peaceful Uses of Atomic Energy held in Geneva in 1958.

He succeeds Mr. S. Cole, an American who was the Agency's first director-general, which position he held for four years.

☆

The board of Pyrotenax announce that **Sir Brograve Beauchamp** has resigned from the chairmanship of the company after 25 years service in that capacity. He will remain a director of the company.

**Mr. F. W. Tomlinson** has been appointed chairman to succeed Sir Brograve in addition to continuing with his present duties as managing director.

☆

**Mr. D. B. Chadwick** has joined Stillite Products, a member of the Turner and Newall group of companies. He will be responsible for their new Filtration Division.

Mr. Chadwick has been associated with the chemical and allied industries for 15 years. He was formerly with ICI Dyestuffs and Pharmaceutical Division and more recently with Rex Campbell, chemical products manufacturers for a wide range of industries.

Thorn Electrical Industries announce that **Mr. G. D. Sparrow,** general manager of their Mechanical and Works Engineering departments, has been appointed to the board of Atlas Lighting.

Mr. Sparrow is also a director of another Thorn subsidiary, Manifold Machinery.

☆

**Mr. T. Wightman,** assistant superintendent of the Large Turbine Department at the AEI, Trafford Park works has retired after 37 years' service.

Mr. Wightman started as a fitter in the Turbine Department of Metropolitan-Vickers and rose progressively to the positions of assistant foreman, foreman, general foreman and finally assistant superintendent in 1952.

☆

The Drop Forging Research Association announces that **Mr. F. E. L. Copley** and **Mr. A. C. Hobdell** have been appointed to the staff.

Mr. Copley is a metallurgist who has joined the Association from BISRA. He will be concerned with material utilisation with emphasis on metal flow and ways of reducing flash.

Mr. Hobdell is an engineer who has joined the association from the Cutlery Research Council. He will be responsible for the study of noises in drop forges and means of reducing them.

☆

The British Motor Corporation have appointed **Mr. C. A. Griffin** as chief engineer, cars, and **Mr. G. Argyle** as chief engineer, commercial vehicles. These promotions follow the recent appointment of **Mr. A. Issigonis** as technical director of BMC.

Mr. C. A. Griffin

Mr. Griffin, who has been deputy chief engineer for the past two years, worked closely with Mr. Issigonis when the latter was chief engineer. The two men worked together on all recent projects in BMC.

Mr. G. Argyle

Mr. Argyle was trained in engineering at Vickers Armstrong, Newcastle-on-Tyne, and served for three years as an engineer in India with the India State Railways. He joined Morris Commercial Cars in January, 1930, as designer and was promoted to chief designer in 1955. He is an Associate Member of the Institution of Mechanical Engineers.

☆

**Mr. A. Vickers,** one of the founders of Fluidrive Engineering Company, more than thirty years ago, will, as from January, 1962, continue to serve the board as a non-executive director.

He will devote part of his time to the affairs of the company.

☆

**Mr. D. G. Dodds** is to become chairman of the Merseyside and North Wales Electricity Board when the present chairman, **Mr. D. H. Kendon,** retires in February.

Mr. Kendon has been chairman of the board since February, 1954, and Mr. Dodds has held the position of vice-chairman since last January.

In 1956 Mr. Dodds became chief industrial relations officer to the Central Electricity Authority and later, industrial relations advisor to the Electricity Council. He left the council at the end of 1959 to join the Merseyside and North Wales Board of which he is now to become chairman.

☆

**Mr. P. McGregor Ross,** has been appointed chief development engineer in charge of the Engineering Development Design Office of the Tube Investments' Research and Development Organisation.

He will be responsible for the specialised engineering involved in improving and developing process plant to meet the advancing requirements of TI. The new Office is being established at Bournemouth.

Mr. Ross is at present Engineer-in-charge of the Mechanical Research and Development Department of C. A. Parsons & Co. He will be joining TI on January 1, 1962.

☆

An internationally known authority on gears and gear-cutting machines, **Mr. A. Sykes,** has retired from the position of director and technical consultant to David Brown Industries. He joined the company in 1905.

To Mr. Sykes' credit goes the introduction of one of the earliest, possibly the earliest, of all apprentice training schemes in the engineering industry. The pattern of the D.B. apprentice scheme with which he was closely associated 50 years ago, was similar to the one universally adopted today, namely that apprentices be allowed to attend Technical College during the day in addition to evening studies.

Mr. Sykes has been a member since 1929 and chairman since 1940 of committees of the BS which prescribe accuracy and other fundamental design and manufacturing procedures covering gears and gear producing machines.

☆

**Mr. R. C. Jenkin** has been appointed manager of a new office opened by Associated Electrical Industries for the Midland Region.

This office is responsible for sales of general industrial products at Coventry.

☆

**Mr. F. J. Everest** has been appointed managing director of Vickers Sperry Rand, formerly Stein Atkinson Vickers Hydraulics.

Mr. Everest succeeds **Mr. C. H. Williams** who has resigned, but who remains chairman of the board of directors.

☆

Babcock and Wilcox announce that **Mr. J. F. Towell** has been appointed resident engineer at the Sizewell nuclear power station, Suffolk. He will be responsible for the erection of the heavy mechanical engineering plant being built by the English Electric Babcock and Wilcox, Taylor Woodrow Atomic Power Construction Co. for the Central Electricity Board.

Mr. Towell joined Babcock and Wilcox in 1917 and in 1955 he was appointed assistant resident engineer at Calder Hall. In 1957 he became resident engineer at Chapelcross nuclear power station and in 1959 he was transferred to Windscale. Since 1960 he has been engaged at Trawsfyndd nuclear power station, and more recently for Sizewell, preparatory to taking up his duties as resident engineer at this site.

Mr. J. F. Towell

Retiring after 57 years' service with the David Brown organisation, Mr. Arthur Sykes (right) director and technical consultant, receives best wishes from Mr. A. Avison, deputy managing director. Also in the picture are Mr. D. Brown Junior, executive director, gear divisions, and Mrs. Sykes.

# PEOPLE in the NEWS

# CABLE TESTING COACH

PANTOGRAPH height, the acceleration forces applied to the pantograph head, contact loss, contact pressure and train speed are among the variables which can be measured by an overhead equipment test unit at 100 m.p.h. produced by British Insulated Callender's Cables in conjunction with Eastern Region of British Railways.

The test unit comprises an instrument coach fitted with two pantographs, and a generator coach providing electrical power and compressed air for raising and lowering the pantographs.

## Losses measured

One of the pantographs is used only for tests carried out with the overhead conductor earthed.

A 300 volt d.c. current supplied from the generator coach is applied to this pantograph while tests are taking place so that contact losses may be measured.

The other pantograph is used for tests when the normal traction current (high voltage a.c.) is applied to the conductors.

Measurement of pantograph height is obtained directly from a 7ft. long linear potentiometer coupled to the collector head by a lightweight glass fibre tube.

## Strain gauges

Strain gauge accelerometers are attached to the height gauge to record the accelerating forces applied to the pantograph and further strain gauges incorporated in the pantograph head measure the contact pressure.

Four chart recorders are carried in the instrument coach: one four-channel unit having a frequency response up to 1,000 c/s, the other three instruments having two-channel facilities and a frequency response up to 25 c/s

THIS WEEK IN PARLIAMENT

# Government takes action on engineering designers

BY OUR OWN CORRESPONDENT

GOVERNMENT action to increase the supply of engineering designers was announced in the Commons last week.

Mr. Denzil Freeth, Parliamentary Secretary for Science, said that Lord Hailsham, the Science Minister, was concerned that industry should make the fullest use of first-class engineering designers.

Despite the great expansion being made in the provision for the teaching of engineering, he was not satisfied that the supply and training of engineering designers was yet adequate for national needs.

"Following a constructive discussion of the matter at the Engineering Advisory Council of the Board of Trade last month, he proposes to pursue it further with the bodies which are concerned with the training of engineers", added Mr. Freeth.

He had been questioned on the subject by Mr. James Dempsey (Labour, Coatbridge and Airdrie) who said the position was causing concern among industrialists.

The MP demanded: "Is he aware that one factory in my constituency had had to import every machine from Germany, because of our lack of industrial designers?"

Mr. Freeth repeated that the Minister was not satisfied with the present position. He and the President of the Board of Trade (Mr. Frederick Erroll) were in close touch and were trying to find ways to improve the situation.

Answering a further point by Mr. Dempsey, the Parliamentary Secretary said Lord Hailsham believed that the designers should be recruited directly into industry rather than through the DSIR, as proposed by the MP.

* * *

The Council for Scientific and Industrial Research has turned down a request for £600,000 from Glasgow University for a new linear accelerator, it was stated. The project was considered in relation to other requests for major items of research equipment from universities.

Protesting at the decision, a Labour MP said the project would have enabled the university to undertake work in an area of nuclear physics hitherto unexplored in Britain.

* * *

Government spending on aircraft production was running at the moment at well over £200 million a year, said Mr. Peter Thorneycroft, Minister of Aviation, when MPs drew attention to increasing concern about future employment in the industry.

The Minister said that with the present pressure of demand any redundancy must be regarded as a natural consequence of re-organisation and rationalisation. He "had ideas" about the future shape of the industry which he was discussing with the industry and with his Government colleagues.

Answering further questions about aircraft factory closures, the Minister pointed out: "Employment in the aircraft industry at the moment is rising and not falling. The fact that in a re-organisation some factories are closed while work is concentrated at others is not a disaster for the industry. It may be just plain common sense."

# Coming EVENTS

**THIS WEEK**

**December 19**
Colloquium on Sheet Metal Testing. Department of Mechanical Engineering, City and Guilds College, London.

**December 30-January 6**
International Racing Car Show, Old and New Horticultural Halls, Westminster, London.

**January 3-13, 1962**
Eighth National Boat Show. Earls Court, London.

**January 8-12, 1962**
International Heat Transfer Conference, Institution of Mechanical Engineers. Westminster London.

**January 9-11**
Eighth National Symposium on Reliability and Quality Control. Washington, D.C.

**January 15-19**
Symposium of Optical Character Recognition. Washington, D.C.

**January 15-19**
Exhibition of Scientific Instruments and Apparatus. Old and New Horticultural Halls, Westminster, London.

**January 22-25**
National Plant Maintenance and Engineering show. Convention Hall, Philadelphia.

**January 24-27**
Canada Farm and Industrial Equipment Trade Show. Toronto, Canada.

**January 27-February 2**
Electrical Engineering Exposition. New York.

**February 16-24**
International Inventions and Commercial Development Exhibition. Centra Hall. Westminster London.

**February 26-28**
Joint I.E.E./R.Ae.S. Conference The importance of electricity i the control of aircraft. London.

**March 9-18**
Eleventh International Inventors Exhibition. Brussels.

**March 13-15**
Conference on Testing for Per formance. The Plastics Institute London.

**March 15**
Symposium on the Computer an Mechanical Engineer. Institute o Mechanical Engineers, London.

**March 20-24**
Eleventh Electrical Engineer Exhibition. Earls Court, London

**March 28-29**
Third Symposium on Engineerin Aspects of Magnetohydrodynamics University of Rochester, Ne York.

**April 9-13**
International Pipes, Pipelines Pumps & Valves Exhibition an Conference, Earls Court, London

**April 11**
Symposium on Modern Rollin Mill Practice. Sheffield University

**April 13-19**
International Refrigeration Fai Olympia, London.

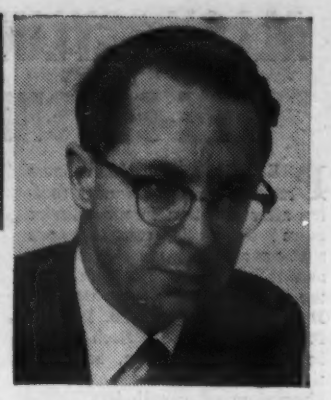
**April 30-May 4**
International Compressed Air an Hydraulics Exhibition and Con ference, Olympia, London.

**April 30-May 5**
Production Exhibition, Olympia London.

**May 1-4**
Contractors Plant Exhibition, Swin ton, Manchester.

# BRITISH INDUSTRY PREPARES FOR THE COMMON MARKET

## Scotland must seize this opportunity to bring in new industries



**J. D. F. Perry, Engineering News Industrial Editor, continues his round-Britain series on the Common Market.**

THERE is no problem in finding engineering companies in Glasgow who have been exporting for considerably more than the past hundred years, who have gone steadily on with their business (wars apart) through many changes of economic climate, and whose interest in the Common Market negotiations now in progress is at once mild, and alert.

In the Midlands the opportunities and the possible threats in a future of union with Europe are a main subject of discussion at meetings, between individuals and in trade association activities.

If this is the case in this Western area of industrial Scotland it is kept well away from the enquiring visitor. The answer lies in what one long-experienced and successful Govan engineer told me: "That is not how we do things here, not by all going around talking about what we are proposing to do. You can be sure there are not many firms that are not thinking now what they intend doing."

### Slow growth

Among the companies I have been visiting there is a keen awareness of the sharpness, and the variety of directions from which competition will come once the tariff barriers begin to fall.

For the Scottish industrial region, which has the special character of being at once an important part of the British manufacturing map and yet on its Northern perimeter, the Common Market question can be put in a quite different fashion.

Will full United Kingdom participation put an end to the prolonged failure to bring employment in Scotland up to the general level of the rest of Britain? Will the sharp prod of reduced tariff protection speed up the growth in Scotland of the lively new industries that have so far favoured the South East, or will the concentration on towns far away from the traditional engineering centres accelerate?

Part of the evidence on which an answer could be based must be the way in which industry in Scotland has reflected the changing scene in manufacturing since the end of the Second World War. While production in British industry overall has not been keeping pace with that of the Common Market states, Scottish output has not equalled the average growth of the UK.

### U.S. confidence

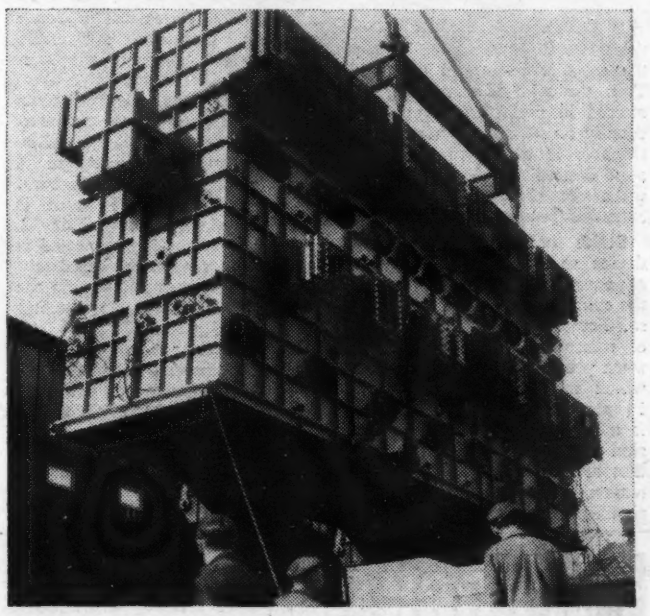
A massive movement of workers to the Midlands and the South East has been going on, and only last month the industrialists and others who drew up the Toothill report on the Scottish economy were still asking for direct air routes with the Continent and better surface transport to the South.

As I travelled out of Glasgow to Bellshill and the Belmos motor control gear company I passed the big Caterpillar Corporation plant, producing heavy duty tractors and demonstrating the strength of United States confidence in Scotland as an area for industrial investment.

In the opposite direction out of Glasgow, and a good deal further, IBM (International Business Machines) have established a swiftly expanding unit.

Within the home-bred companies I found no lack of aptitude in keeping abreast of change. Frequently I found that concerns with a long tradition in one field have now added to their output equipment for new industries, like petrochemicals, or marked up on their wall maps new overseas territories in which to deploy the sales force.

Mirrlees Watson Ltd., of Scotland Street, Glasgow, exported their first cane sugar mill in 1841, only a year after the foundation of the firm. Growing with the sugar industry (between 1850 and 1859 the company sent 85 mills to Cuba), Mirrlees Watson equipped sugar mills from the West Indies to Malaya with their plant.



**Hoisting a Weir Multiflash marine evaporator aboard the Shaw Savill liner "Northern Star".**

### Into chemicals

Among recent contracts has been a white sugar refinery in Kenya and the demand for sugar making machinery is still strong from many countries. Seventy per cent of the company's output, a good part of which is for sugar mills, goes overseas.

But local manufacture overseas is as lively in sugar mill machinery as in more widely known products. In India the Glasgow company has a large interest in Binny's Engineering Works in Madras, supplying technical know-how and handling the steam turbines and instrumentation.

The development of engineering industries in Australia, where a vigorous cane sugar industry created a demand for the mills, has led first to Australian home manufacture of their own equipment and now to the export of Australian built cane mills.

This is a movement which will spread with time and it is typical of some of Glasgow's long established engineering firms that Mirrlees Watson have successfully gone into making equipment for the chemical industry.

### High standards

Much of the vacuum plant for the leading chemicals manufacturers is made by the company. Mr. Storrar, sales manager of Mirrlees Watson, suggested to me that in this field of its activities closer association with the Common Market countries could bring some useful opportunities.

The same story of spreading into producing for chemical plants and petroleum installations is going on at the Belmos Company Ltd., where a large proportion of the total effort is directed to flameproof equipment for the National Coal Board.

For a company like Belmos the effect of the National Coal Board upon the policies of the European Coal and Steel Community, once Britain was taking a full part in EEC, would be extremely interesting.

The NCB set very high standards for their flameproof switchgear, standards which must have an effect on the cost of equipment able to pass the tests, although there is still a market overseas for gear which comes up to the standards from which the NCB has now moved on.

It might be that one change the Board could bring about would be a speeding up of the raising of these standards in the Continental mines, which would give British suppliers the opportunity to make progress in markets where price differences at present hold them back.

Like other manufacturers of flameproof equipment, Belmos also find a growing interest in local manufacture in the Commonwealth. They are represented in Bombay and train numbers of Indian students who have graduated at Scottish universities.

Mr. David Coull, the export manager of L. Sterne and Company, one of the refrigeration companies, was preparing for an overseas tour taking in Pakistan and returning through Africa, when he told me: "Italy, Germany, Holland, Belgium can sell refrigeration in this country. We must have other outlets, we cannot depend on the Commonwealth for our market. Provided we go in on equal terms then we should be able to go into Germany and Italy with an opportunity equal to that which they have in this country."

### Joint exports

Exporting directly some 30 per cent of its output, and with more of its production going overseas in other people's final assemblies, Sterne refrigeration equipment goes to the Middle East, where there is quickening interest in very large ice plants, to many parts of Africa, to Australia, New Zealand, Burma, Greece, to Europe and so on.

Restrictions on import licences have held back trading with India.

Nearer home a lot of work has been done for Norway and Sweden, particularly in the shipyards, and in the supply of fish freezing plants.

One contract may be cited as a forerunner of the sort of agreement that will become more and more common in Europe. This was refrigeration equipment for a Danish firm, who supplied the air conditioning plant for a contract which was finally assembled in India.

In the Commonwealth, East and West Pakistan are both areas where the demand for refrigeration plant is on the increase, and where Sterne are able to lay claim to a growing share of the market. In the Middle East, living standards are beginning to rise and with them there is a better market for ice plants and refrigeration equipment in cold stores for food.

### Getting ready

The special contribution of the Common Market countries with their large demand for industrial refrigeration for a company such as Sterne is to give, in effect, an enlarged home market. The company already competes in Germany, France and Italy.

An engineering company seeking inside advice on setting up their organisation for a European Community might well go to G. & J. Weir Ltd., the pump and boiler feed system engineers.

In recent years G. & J. Weir have completed their representation throughout Western Europe in a way that gives them an excellent springboard for extended operations on the Continent.

In Paris the company have an association with the organisation Société Weiritam. This is particularly concerned with power station and marine boiler feed systems and pumps, and also functions in Belgium. The Italian link is the Societa Italiana Weir and Itam, with headquarters in Milan.

For West Germany, G. & J. Weir GmbH is at Hamburg. In Holland the wholly owned subsidiary Weir-Warmtekracht NV at Rotterdam cover marketing and repair work. Outside the orbit of the Treaty of Rome there is also Weir Espanola SA, in Madrid.

Common Market prospects for G. & J. Weir, are good as an important part of their export possibilities on one side of the business is tied up with progress in power stations. As the Central Electricity Generating Board lead the way with larger and larger generating sets, so those concerned with engineering the pumps and the feed systems meet and cope with higher pressures and temperatures.

As this process continues so the makers of the generating sets and their equipment will have the technical knowledge and the working models to point to, which could sway the decision of an overseas electricity authority weighing up the tenders for important new power station plant.

### Pace makers

Like Belmos who find outlets for their flameproof switchgear in installations where explosion hazard exists, and Mirrlees Watson producing sophisticated stainless steel filters, Weir are developing strongly in manufacture for the chemical and petroleum industries.

They have strengthened their hand in this field by a valuable licence agreement with Pacific Pumps Incorporated, of California, covering equipment for process control duties in chemical and petrochemical installations.

The activities of these and other companies show that from many Scottish concerns there is no lack of adaptability, of willingness to meet changing demand in the product's performance, to go after new markets where the old are failing or closing up in protection of home industries.

That the overall showing of the Scottish economy has not been better than it has shows that the efforts of a number of pace-making firms are not enough to set the whole industrial region pushing ahead to a much higher rate of growth, to the removal of the unemployment problem, to getting on with badly needed rebuilding.

If the opportunities of making Britain part of one large European home market are to be seized as surely as the competition will certainly appear, one thing, the most difficult of all, will have to be done.

Real expansion, both of output and of new firms setting out, will depend on stopping the drift away of skilled labour and overcoming the difficulty of recruiting able, qualified engineers.

This is an awkward dilemma. Delays in obtaining qualified engineering staff can be a serious handicap in undertaking new projects. But without new projects and an air of success the sought-after men are away to brighter prospects.

For Glasgow and Scottish industry it seems that certain firms, already successfully competing against Continental competition, will do well in the Common Market. In more general terms, if Britain goes in it will make even more urgent the need to correct the failure to expand at a lively rate and to develop the full productive abilities of the area.

This is very much easier to say than do.

The newer forms of the engineering industries that have grown up, largely in the south east, over the last thirty years have a confidence in looking forward to equal competition in the European Economic Community that springs from having made for themselves, in competitive times, a place in industry where before them their particular skills and products did not exist.

Plainly enough, Scottish industry's contribution to the swift-changing world of electronic equipment, of aircraft or motor vehicle development has for a number of reasons not been equal to its traditional importance as a leading part of British industry.

Exhortation and advice cannot bring a fresh burst of new ideas. Since the Common Market will inevitably bring added competition in the markets where Scottish industry is now well established.

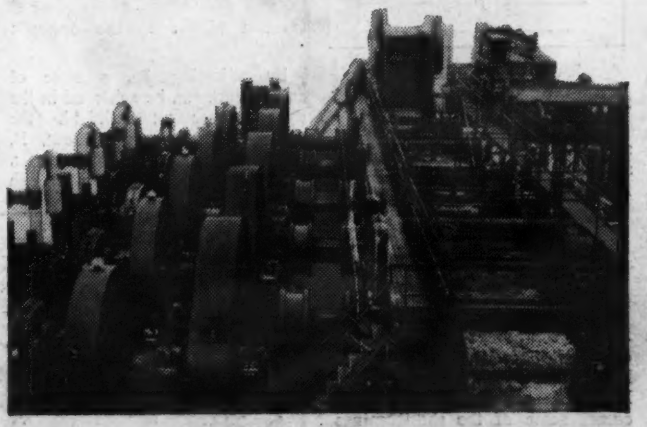
The evident opportunities of the larger European market will give some Scottish companies larger volumes of business.

With these strengthened resources perhaps their best contribution to the future prosperity of the region will be to undertake new developments and enter fresh fields of engineering.

On this basis the expected rise in the level of European industrial activity could solve the problems of unemployment and slow industrial growth.

**NEXT WEEK**

**Swansea**



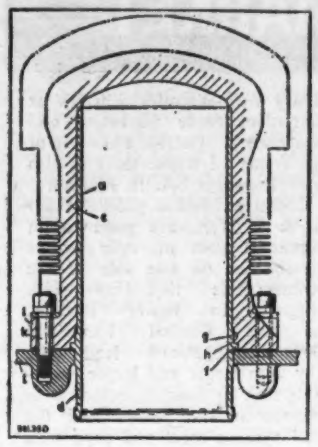
**A Mirrless Watson cane milling plant for Ceylon, capable of handling 2,000 tons a day.**

# ALLOY CYLINDERS WITH PRE-FINISHED LINERS

PRE-FINISHED cylinder liners requiring no subsequent tooling after insertion in the cylinder barrel or block, and that are automatically located by assembling the cylinder blocks on the crankcase, are proposed by **Davey, Paxman and Co. Ltd.**, in **Patent No. 881,350.** Such liners, in steel or cast iron, are particularly intended for use in aluminium alloy cylinders.

The liner is subjected to compression in a honing jig before being bored and finally honed. As an example, a 6.3825in. diameter lining is pressed into a jig of 6.380in. diameter for honing. When released from the jig, some expansion occurs and the liner *a* is inserted into a cylinder block *e* as shown in the illustration, it again undergoes a slight compression in which it assumes its working formation.

An annular flange *f* formed on the liner and a slightly enlarged-diameter section *g* above it, engage on assembly in a stepped recess *h* in the base of the cylinder barrel. The lower portion *d* of the cylinder liner projects a certain distance into the crankcase *l*, the edge of the crankcase aperture through which the liner passes engages beneath the flange *f* of the liner. Thus the liner is held rigidly in the correct position, between the lower end of the cylinder barrel and the upper surface of the crankcase, when the bolts *k* holding cylinder to crankcase are secured.



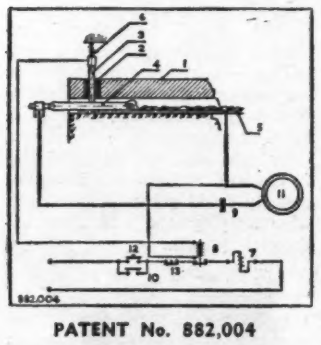
PATENT No. 881,350

## ARC-BREAKING DEVICE FOR WELDING

AN automatic arc-breaking device for use in arc welding where the electrode is statically and axially disposed on the workpieces, is described in **Patent No. 882,004** by **Bratislavske Elektrotechnicke Zavody, Narodny Pondnik,** of Czechoslovakia.

In the illustration, an electrode 4 is laid on the workpiece to be welded and held down by an upper welding ledge 1. At the point at which the arc is required to be broken, electrode 4 is coated with a non-conductive coating. Contacting electrode 4 at this point is an auxiliary electrode 3 mounted in the ledge 1 and spring-loaded on to the insulated portion of electrode 4. The auxiliary electrode 3 is connected to the control circuit of contactor 7.

In operation, as soon as the welding arc burns through the non-conductive coating and touches the auxiliary electrode 3, a relay 8 is energised to break the contactor circuit and switch off



PATENT No. 882,004

the welding current.

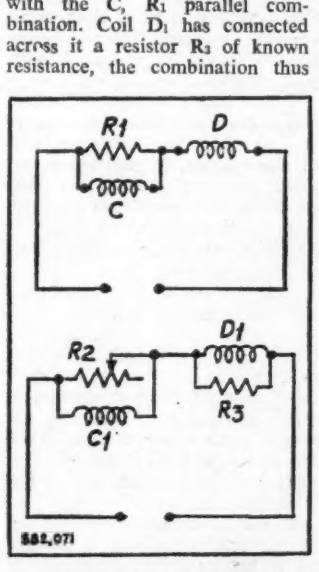
A pressure switch 12 serves for switching in the welding voltage again, and push-button 13 allows for manual switching off.

## ACCURATE MEASURING OF RESISTANCES

A NEW circuit arrangement for the accurate measurement of electrical resistance, described in **Patent No. 882,071** by **Associated Electrical Industries Ltd.**, overcomes some of the shortcomings of existing methods. In the Wheatstone bridge method, for example, the ratio and adjustable arms of the bridge need to be highly stable under heavy current conditions; this disadvantage is avoided in the invention.

The arrangement, as illustrated, comprises two separate circuits. One contains the resistance $R_1$ which is to be measured. The other contains a resistance box $R_2$. An uncalibrated two-element dynamometer detector device has high-resistance coils C, $C_1$ of its first and second movable elements respectively connected across $R_1$ and $R_2$. The first and second movable elements of the dynamometer detector are also provided with low-resistance current coils $D_1$ and D respectively.

Coil D is arranged in series with the C, $R_1$ parallel combination. Coil $D_1$ has connected across it a resistor $R_3$ of known resistance, the combination thus




PATENT No. 882,071

formed being arranged in series with the $C_1$, $R_2$ parallel combination.

Now assuming that a light current $I_1$ is flowing through $R_1$ and that a voltage $V_1$ exists across $R_1$. Also, current $I_2$ is flowing through $R_2$, and $V_2$ is the voltage drop across $R_2$. The current of substantially $I_1$ amps in coil D and the voltage $V_2$ across the coil $C_1$ exert a torque on the shaft of the dynamometer detector, while the current flowing through coil D, and the voltage across coil C exert a torque in the opposite direction.

By adjusting $R_2$, a state of equilibrium can be achieved in the dynamometer at which the opposing torques cancel out. If, in this equilibrium condition, a current $I_3$ amps is flowing through $R_2$ and the voltage across it is $V_3$ volts then:—

$$V_1 \frac{I_3}{K} = V_3 I_1$$

where $\frac{I_3}{K}$ is the current passing through coil $D_1$, the value of K being determined by the relationship between the resistance of coil $D_1$ and $R_3$.

$R_1$ is given by $\frac{V_1}{I_1}$ and (at balance) $R_2 = \frac{V_3}{I_3}$

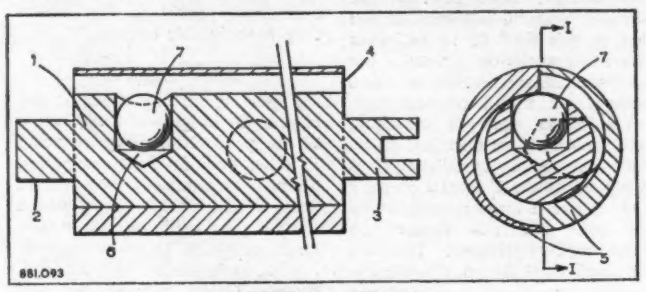
Thus $\frac{R_1}{R_2} = \frac{V_1}{I_1} \cdot \frac{I_3}{V_3} = K$

Since the values of K and $R_2$ are known, the resistance $R_1$ can be readily calculated.

Because the currents involved are light, increase in resistance due to heating effects are negligible and the value of K will remain substantially constant, and the indicated value of $R_2$ at balance will be a substantially true value.

## MECHANICAL VIBRATOR FOR WIDE APPLICATION

A MECHANICAL vibrator capable of generating high frequency vibrations is described in **Patent No. 881,093,** granted to




PATENT No. 881,093

**J. W. and T. H. Carter Ltd.** and **George Malbon.** It is suitable for a diversity of applications, such as tools for vibrating and compacting concrete, hoppers feeding granular or powdered materials, liquid-containing tanks, vibration testing equipment, and so on.

The vibrator comprises a rotor 1 running on antifriction bearings and enclosed in a housing 4. The latter, which is cylindrical externally, is formed with two cams 5 each of which progressively increases in height to terminate in a step.

Along the length of the rotor are radial bores 6 spaced angularly from one another. In each bore there is a freely movable steel ball 7.

The rotor 1 is rotated at high speed so that the balls 7 are subjected to centrifugal force which tends to throw them out from their bores. As the balls are carried round with the rotor, they roll up the cam surfaces 5 and are thereby pushed back into their respective bores, until a ball passes over the camstep when it flies out and strikes the housing at the shallowest part of the adjacent housing.

For every revolution of the rotor, each ball strikes the housing twice. The frequency of vibration thus imparted depends on the rotor speed and the number of balls. The amplitude depends upon the mass of the balls.

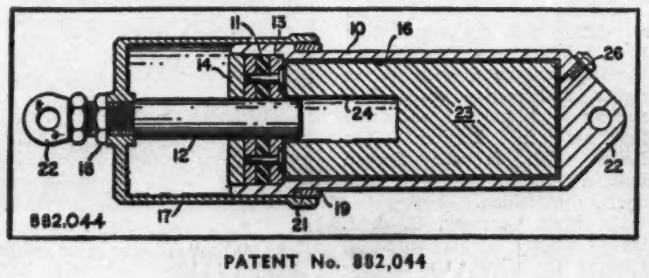
## HIGH ENERGY SPRING FROM AMERICA

THE spring device proposed in **Patent No. 882,044** by **Cleveland Pneumatic Industries Inc.** of U.S.A. is claimed to achieve the same high energy levels of absorption as a liquid spring of similar size and weight, but with the advantage of being substantially insensitive to temperature variations. This is accomplished by means of a compressible solid completely immersed in a pressurising liquid, the pressure of which is varied by means of a plunger which may be of relatively long stroke and small diameter.

Referring to the illustration, a cylinder 10 is closed at its outer end by a seal assembly 11 and plunger 12. Within the chamber 16 inside the cylinder a compressible solid 23 is introduced, shaped generally to conform with the shape of chamber 16 and having a centrally located bore 24 to receive the inner end of the plunger 12 when it moves inwards to the compressed position.

The remainder of chamber 16 is completely filled through the charging connection 26 with a liquid which acts as a hydraulic couple to compress the solid 23. The solid is proportioned so that there is a slight clearance between the cylinder walls and the solid. Thus the solid is completely immersed in liquid and compressed equally on all of its surfaces. The chamber 16 can be pressurised to any desired precharge pressure when the plunger 12 is in the extended position.

Solids for use with this spring device should have a coefficient of expansion similar to that of the cylinder 10. The compressible solid must be resilient and capable of returning to its initial density when pressure is relieved. Caesium, which is compressible by about 16 per cent at 70,000 lb./sq. in., is a suitable material; its expansion coefficient is smaller than that of steel so that the effect of temperature changes will not be significant. Other possible materials include solid silicone polymer, Teflon or nylon.




PATENT No. 882,044

# new PATENTS

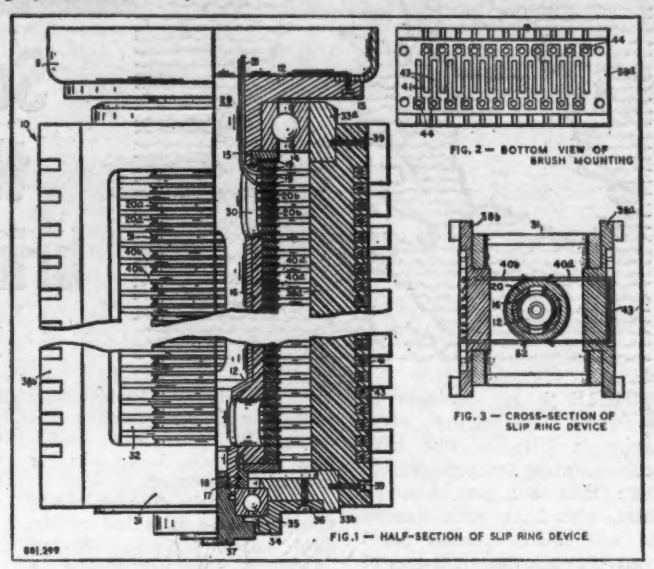


FIG. 2 — BOTTOM VIEW OF BRUSH MOUNTING

FIG. 3 — CROSS-SECTION OF SLIP RING DEVICE

881,299 FIG. 1 — HALF-SECTION OF SLIP RING DEVICE

## SLIP RING ASSEMBLY IN MINIATURE

BECAUSE of the difficulty of mounting a multiple brush assembly in a confined area, slip ring devices have usually been somewhat bulky and unadapted to miniaturisation. This difficulty has been overcome in **Patent No. 881,299, granted to North American Aviation Inc.,** which describes a slip ring device, of low friction and low noise level, in which a number of brushes are mounted in a very small area. The brush members, moreover, are easily removed for cleaning and replacement.

In the slip ring assembly shown in the half-section view the interleaved slip rings 20a, 20b, separated by insulating spacers 19, are mounted on a cylindrical insulator 16 which in turn is secured on the hollow shaft 12. Conductive wires 21, connected at one end to a terminal board (not shown) pass through holes in the hollow shaft 12 and the insulator 16 to the slip rings 20a, 20b.

A rectangular brush-mounting frame 31 surrounds shaft 12 and is rotatably mounted on it by ball bearings 14 and 34. Brush blocks 38a and 38b (preferably nylon mouldings) are mounted on opposite longitudinal faces of the block 31. A number of T-shaped terminal strips 43 are mounted in corresponding grooves 41 in each block, in which they are retained by friction. One end of the terminal strip may have a connection terminal 44. The U-shaped wiper brushes 40a, 40b, formed preferably from resilient wire stock, are each permanently mounted in a groove 50 in the terminal strip 43 by means of a swaging or crimping operation.

PATENT No. 881,299

Brush blocks 38a and 38b are mounted on frame 31 so that brushes 40a, 40b are interleaved so as to contact respectively slip rings 20a, 20b in a direction generally tangential to the ring periphery. This technique of staggering the brushes between the two brush blocks results in a maximum spacing of each individual wiper brush.

The wiper brushes 40a, 40b ride in grooves in the periphery of slip rings 20a, 20b. For minimum friction and low noise levels, the surfaces of these grooves are formed so as to be complementary to the surfaces of the wiper brushes.

As the two arms of the U-shaped brush engage opposite portions of the slip rings, maximum electrical conductivity is ensured regardless of the direction of rotation. For ease of removal and replacement of the brush assemblies, bent portions 52 may be formed on the ends of the brushes.

In the device illustrated, 44 slip ring connections are possible in an assembly some 2¼in. long. A more compact arrangement can be obtained by having brushes on all four sides of the mounting frame, and a still more compact assembly could be achieved by using a frame of hexagonal cross section.

# BOOK REVIEWS

**The Million-Dollar Bend.** C. Eisler. The William-Frederick Press, New York, 315 pp. $4.75.

It is always interesting to read of the struggles and achievements of a man who has made his mark in his chosen field of activity.

Dr. Charles Eisler arrived in the U.S.A. in 1904 with $1.96 in his pocket, but with the additional advantage of some training as a toolmaker.

In this autobiography, he tells of his progress as an engineer, not always very easy, until he achieved prominence as an industrialist and inventor. Eisler is perhaps best known for his developments in the incandescent lamp industry.

His bent-tube exhaust method has proved of such value in the manufacture of wireless valves, enabling intricate bending and welding of small glass tubes at high speed, that the result of his ingenuity was well called the "million-dollar bend".

The book tells the expected story of success brought about by a combination of technical skill and commercial astuteness. The author does, however, make the story less unpalatable than it might have been by a disarming frankness about his failures, and his aims in life.

The book is pleasant enough reading on the whole, and is enlivened by some quaint drawings and family photographs.

Electrical and electronics engineers may well gain some inspiration from Eisler's account of his life.

**Year Book of the American Bureau of Metal Statistics, for the year 1960.** A.B.M.S., New York. 139 pp. $4.50 hard cloth covers, $4.00 soft paper covers, 25c. extra for postage.

The fortieth annual issue of the A.B.M.S. Year Book is an enlarged edition, and records for 1960 and previous years, mine production, smelter production, consumption, imports and exports and other economic statistics on a world-wide basis.

This international survey is compiled by the Bureau, which is sponsored by important producers of copper, lead, and zinc in the U.S., Canada, Mexico, Chile, and Peru.

Copper, lead, zinc, nickel, aluminium, bauxite, gold, silver, tin, antimony, cadmium, cobalt, magnesium, molybdenum, platinum, and sundry ores and metals are reported.

There are also introductory notes on the major non-ferrous metals reviewing the events of 1960. Tables of metal prices, monthly and annual; lists of metallurgical plants and their capacities; general economic statistics of the U.S. and U.S. duties on principal ore and metal imports are given.

There are also other data, including tables of production statistics by companies, both in the U.S. and elsewhere.

This Year Book gives a great deal of statistical information for market analysis and industrial surveys.

**Reinforced Concrete.** J. Faber & F. Mead. E. & F. N. Spon, Ltd., London. 532 pp. 75s.

The second edition of Oscar Faber's Reinforced Concrete has been very considerably expanded and largely rewritten. This new edition aims at providing an up-to-date account of the theory and practice of reinforced concrete design for consulting engineers and designers.

New chapters have been added on slabs, retaining walls and concrete roads. The chapters on the elements of reinforced concrete design, foundations, bunkers and silos, shell-concrete roofs, water towers, reservoirs, chimneys and prestressed concrete have been substantially expanded.

## NEW LATHE ANTICIPATES EUROPEAN REQUIREMENTS

# Three machine tool exhibitions open in London

THREE firms have opened exhibitions of British and foreign machine tools in London this week.

The firms are: Gate Machinery Co., 172 Victoria Road, Acton, W.3; B. Elliott (Machinery), Victoria Road, N.W.10; Mortimer Machine Tool Co., Acton Lane, N.W.10.

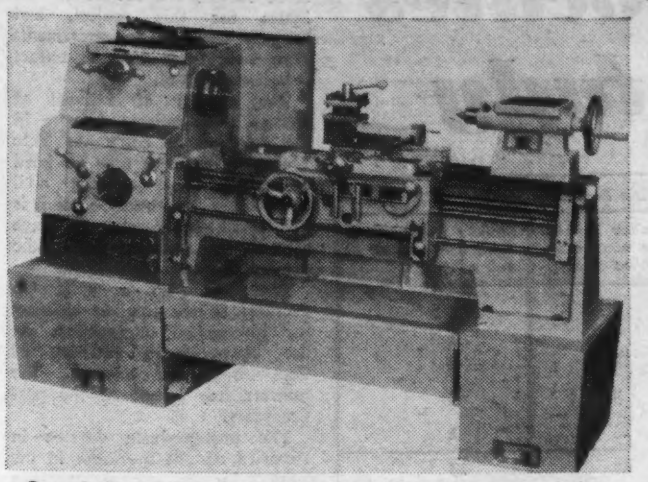
**Elliott's** are putting a new range of lathes on the market called Type SS and SC with high speed geared heads.

Alternative ranges 30 to 2,500 r.p.m. or 20 to 1,650 r.p.m. are available, each with 12 spindle speeds, while the use of a two-speed motor permits a speed range of 20 to 2,500 r.p.m.

The Elliott Omnispeed drive uses belts to transmit the four highest speeds to the spindle from 720 to 2,500 r.p.m., while the eight lower speeds from 30 to 525 r.p.m. are given through the geared headstock.

Large diameter bearings and a substantial spindle, permit a 2in. capacity bore through the spindle.

The machine anticipates European market requirements and



One of the new range of Elliott Type SS and SC centre lathes. it has facilities for fitting Continental type quick-change chucks.

lathe on show is a neatly designed precision lathe hailing from Czechoslovakia. It has a 380mm. swing over the bed and a distance between centres of up to 1,250mm. Spindles are selected from a range of 21 steps (14 to 2,800 r.p.m.).

From Nyberg & Westerberg AB of Sweden comes an 18in. by 6in. hydraulically operated surface grinding machine. It is simple and easily handled and can produce accurate and high surface finish within the wide working area of the table.

The worktable can be operated by hand or hydraulically with an infinitely variable traverse rate of up to 40 ft./min. Table work surface is ground in position and provided with a tee-slot for clamping workpiece or magnetic chuck.

The wheelhead is housed in rigid vertical slides inside the vertical column and is counterbalanced.

A newly imported Polish drilling machine WKA25 of 1¼in. dia. drill capacity has a gearbox and electric motor mounted on the top part of the vertical column of the machine, and a box-shaped headstock and spindle which can be adjusted for vertical height.

The machine can also be used for milling and lapping.

A range of Induma milling machines from Italy includes horizontal, vertical and universal types.

The Superindumatic 3U-59 universal milling machine is strongly built for high production operations with maximum use of tungsten carbide tools.

Seen at the **Mortimer Machine Tool Co.** was the hydraulic surface grinding machine SJ16 making its first appearance in this country from Svend Jakobsens Maskinfabrik A/S, Kastrup, Denmark.

This machine has an automatic hydraulic downfeed with increments from 0.002 to 0.02mm. per stroke. The intermittent cross feed is infinitely variable up to 20mm. per stroke.

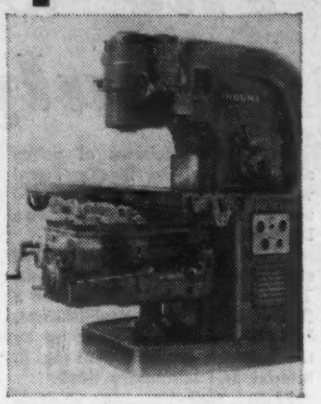
The automatic down feed is controlled by pre-setting the dial situated above and to the right of the grinding wheel. The counterbalanced wheelhead moves on anti-friction rollers which eliminates stick-slip movement.

The machine is equipped with three electric motors; 3½ h.p. for the wheel, 1½ h.p. for the hydraulic pump, and ¼ h.p. for vertical traverse.

Automatic lubrication is provided for the table and saddle ways. Optional equipment includes rack and pinion for manual table control.

A useful addition to the workshop is the Fromag keyseating machine from the Ruhr. On this machine, components are keywayed by means of an inserted cutter which is rigidly clamped at the upper end of the cutter bar.

The cutter bar slides in a guide bush and is connected to a drawbar. The table is automatically moved forward during the return or upward stroke of the cutter bar and any contact between cutter and workpiece is obviated.



The Induma vertical milling machine is strongly constructed and has a swivelling head.

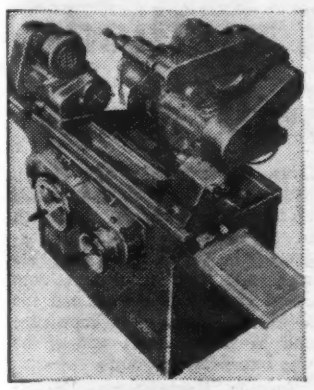
Among a small selection of American machines to be seen here is the Fab-30 filing machine from Grob Inc., Gratton, Wisconsin, with a 30in. throat.

The machines can be quickly set up with differently shaped files for external as well as internal filing and lapping.

The file chains are of a simple self-locking design. The files themselves are rigid, about six inches long, and are connected at their mid-points to the flexible band which carries them over pulleys or wheels in a manner similar to that of a bandsaw.

When the flexible band straightens, the files present an effectively straight unit at the operating position. To open the file chain, a lever quickly releases tension.

Chips are carried downward and filing can be carried out accurately to the centre of a drawn line.



The Ribon universal grinding machine on show from Gate Machinery.

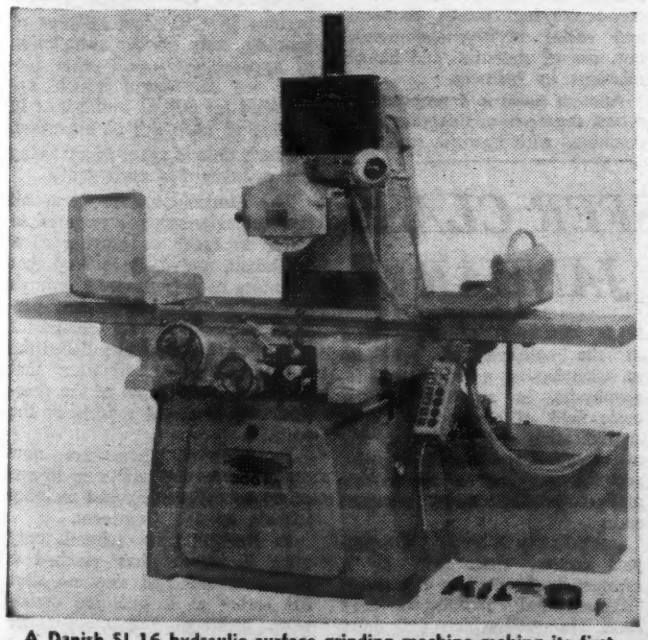
provides a D.I.N. 6-flanged spindle and quick-change swashplate.

From a totally enclosed dial-change feed box all standard threads from 1¼ to 80 t.p.i., including 13 and 19 t.p.i. are obtained direct in 45 changes and 0.1875mm. to 10mm. in 24 changes, are obtained in a similar manner; selection being possible while the machine is in motion.

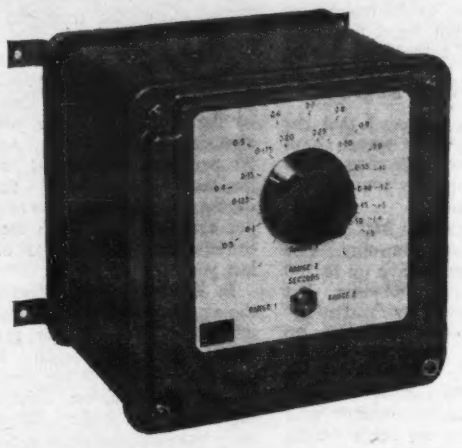
Among the selection of Continental machine tools on display in the **Gate Machinery** showrooms is the Ribon universal grinding machine.

Grinding wheel head is of rigid design and is positioned on a large swivelling base. The table can be adjusted for grinding tapered parts.

A Strojimport SV18R centre



A Danish SJ 16 hydraulic surface grinding machine making its first appearance in this country at the Mortimer Machine Tool Co.

Exterior showing calibrated dial covering two typical ranges.

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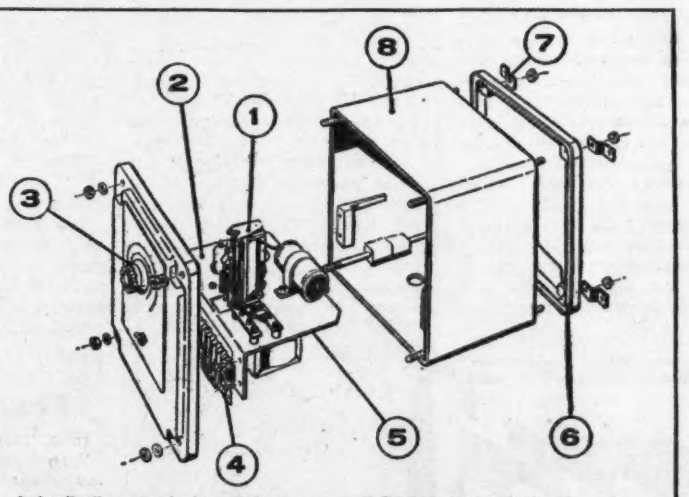
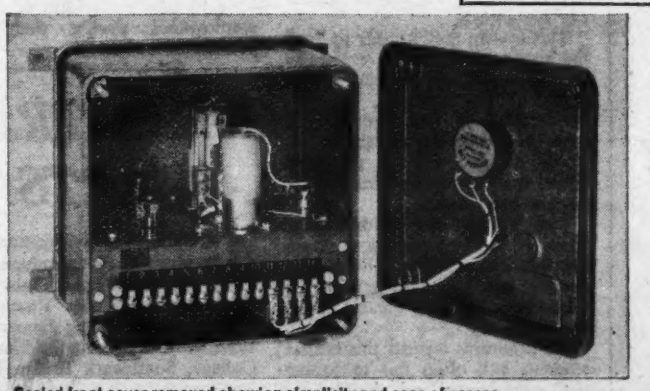
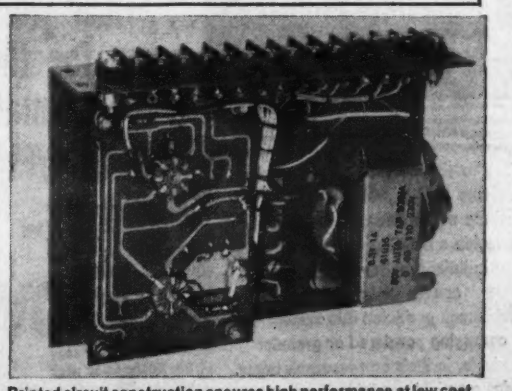
Designed to high engineering standards and up to the minute techniques, this rugged timer unit in dust and moisture sealed cast alloy case is available in six versions with overlapping time ranges from 0.1 to 500 seconds. Directly time-calibrated dial permits precision setting to match the repeat accuracy capability of the unit. For further details write to Standard Products Division for Publication D.6111-01.




1 Application proved relay with heavy duty contacts
2 Easily withdrawable chassis
3 Time calibrated dial for accurate setting
4 Accessible customers' connections
5 Printed circuit sub-chassis
6 Case sealed against ingress of dirt and dust
7 Adaptable mounting arrangements
8 Cast light alloy case



Sealed front cover removed showing simplicity and ease of access.



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EDUCATION and TRAINING

# The U.S. advocates analytical study

CRITICISMS are often heard about the standard of American university degrees but it is interesting to examine how and where the educational system differs from Britain's, and to recall the experiences of a university lecturer, Dr. P. Grootenhuis, reader in Mechanical Engineering at the Imperial College of Science and Technology, who has just returned after lecturing for six months at Cornell, one of the principal American universities.

Cornell is one of the eight universities in the Ivy League; the main difference between the Ivy League and State universities is that the former rely on endowments for their support instead of State assistance.

This is perhaps the main factor for the Ivy League universities being among the principal universities in the United States, since a lowering of their standards would bring a reduction in the supporting endowments.

## Five years

There are several hundred universities in the U.S. and the standard of education varies greatly between them.

The under-graduate degree course in engineering at Cornell lasts for five years, but this is a year longer than most universities in America. By English standards this is two years longer than most universities in this country, although in Scotland a four year degree course is common.

Students enter the university having reached an education level approximately equivalent to that obtained at the end of one year in a Grammar School sixth form.

Throughout the five years the course is applied to a wider field of subjects, and any intensive degree of specialisation is not embarked upon until the post-graduate years.

It is normal during the first year to include English as a compulsory subject and other non-engineering subjects — usually including a foreign language. This is extended into succeeding years and one sixth of the course must consist of liberal studies.

But since the standard of primary education is lower than in this country the level of these studies is often rather elementary.

The engineering department at Cornell has a Dean who acts solely as an administrator and does no lecturing.

Any major decisions of policy are made by the faculty board which is composed of about 130 members from the various branches in the faculty.

There are approximately 130 staff members to 1800 students. This ratio is relatively low for a further educational establishment, but the deficiency is made up by the research students assisting in tutorial and laboratory work.

Many post-graduate students rely on this work as their main source of income.

The engineering faculty at Cornell has eight departments: aeronautical, agriculture, civil, engineering physics, electrical, engineering mechanics and materials, metallurgy, and mechanical; the latter is divided into four further departments: industrial design, mechanical design, thermal engineering, and industrial engineering.

Engineering Physics is a relative newcomer, and is becoming extremely popular in the United States.

The course is designed to combine the basic scientific and analytical training of the physicist and the mathematician with knowledge and experience in applying this training to problems in engineering research and development.

Thus the major part of the course is directed towards mathematics and physics. In addition, study is made of the basic properties of materials from constituent atoms and molecules to bulk physical, electrical and chemical properties.

## Credit system

Due to the topicality of this subject the John Hopkins University has abolished its conventional courses of mechanical engineering and civil engineering, and transferred to engineering physics. Electrical engineering is also very popular in America at the moment.

The method of teaching is left to the individual department. At Cornell, as at most other American universities, the "credit hour" system is adopted. Each subject is evaluated in terms of credit hours: the fundamental subjects of the course will have the maximum number credited to them.

Cornell Engineering Faculty, 1960.

| Department | Number of Freshmen, 1960 | Number Failed one course at end of year | Number failed more than one course at end of year. |
|---|---|---|---|
| Chemistry | 126 | 7 | 3 |
| Civil | 48 | 9 | 1 |
| Electrical | 179 | 13 | 5 |
| Engineering Physics | 72 | 3 | 3 |
| Mechanical | 140 | 15 | 1 |
| TOTAL | 565 | 47 | 13 |

It is usual for a student to work on average 18 credit hours per week: a main subject acting at full value of one credit hour for one hour's work, but in the case of humanities and laboratory work the contribution to the number of credit hours will be a fractional amount of the actual time put in.

## 60-hour week

It has been estimated that the average student will spend about 60 hours a week attending to his studies, including his course work and home work.

The classes start at 8.00 a.m. including Saturday morning. The main lectures may have up to 200 to 300 students attending, but these are followed by "recitation" periods where the class is split up into groups of about 20 students.

The recitation period is a form of tutorial, and usually is taken by a post-graduate student who will also follow the main lecture course.

The main subjects are laid down by the department, but the "electives" are the choice of the student. These may compose about 30 per cent of the number of credit hours required. The subjects will be taken from the many additional courses that are offered within the university.

This often gives programming difficulties for the individual student arranging a suitable timetable, since many elective lectures clash with main lectures. However, often lecture-courses are repeated the following semester.

The American academic year is divided into two semesters, compared with our three terms: there is only a three-day break at Christmas.

## Textbook-use

The radial difference in the form of lecturing is the extensive use made of textbooks. Each course of lectures follows a prescribed textbook, and an assignment sheet devised by the faculty board lays out the time that is to be spent on each chapter and the questions that are to be set for homework.

This system may appear to limit the scope of a lecturer, especially if he has little or no part in the choice of the textbook, but this, fortunately, is not usually the case. However, the student knows which chapter will be discussed at the next lecture and has to prepare it beforehand.

This relieves the tedious operation of copying equations from the blackboard and allows the lecturer more time to express his own views and give greater attention to detail.

An argument against this is that students will often fail to follow the assumptions and the derivation of an equation thoroughly when laid out in a book, but, having been taken through it step by step on the blackboard, which is the policy normally adopted in this country, he is more likely to have it impressed on his memory.

The working to recognised textbooks ensures that the student has a wide library at the end of his course, which is very often lacking with British students, since in some cases it may be possible to pass an examination on the knowledge gained from the notes alone.

At Cornell it is compulsory to do the homework, and about 20 per cent of the final total marking at the end of the five years is allocated to this section. Another 30 per cent is donated to preliminary examinations taken during the five years: the other 50 per cent is attributed to the final examinations at the end of the last year.

In the engineering department the standard is high, and students with less than 60 per cent in examinations are usually failed, and those below 70 per cent may be put on probation. Throughout the five years a wider syllabus will have been covered than at English universities, but the depth of final knowledge will be less.

## Failure list

The accompanying table shows the examination failure list for freshmen in the engineering department at Sornell in 1960. This shows that in spite of the high standard under 10 per cent failed, which is low in comparison to some British universities and colleges.

Since Cornell is one of the leading universities it has the chance to pick the better students, but a lot must be attributed to the enthusiasm of the students, which according to Dr. Grootenhuis was more fervent than that found at British universities.

The consciousness of the need to get a degree to achieve any recognisable status in America and the fact that America is still a comparatively young country may be the main contributors to this. Also since most of the students have to pay the fees of $1,600 per annum and contribute $1,500, at least, for living expenses, they have to take some form of casual employment during their five years.

The low numbers of freshmen in the civil engineering department reveals the decline in the States for this subject, and recently television advertisements have been introduced to attract boys from school.

The number of failures at Cornell also indicate a lapse in the standard of entry. At Yale University there is now no head or acting head of the civil engineering department, since it is considered unnecessary to have men of this standing during the present decline.

There is also a noticeable decrease in the number entering for mechanical engineering. At the Massachusetts Institute of Technology, for example, the number has halved in the past five years.

The post-graduate degrees in America do not specialise in the subject to the same extent as in this country. The Master of Science degree is accompanied with a course of lectures and a dissertation; the latter only consists of about 20 per cent of the final marking; whereas in Britain it may be unnecessary to attend any lecture courses—the entire course being judged on a thesis.

An American engineering degree tends to be more analytical than the British counterparts, and less importance is stressed on the need for experiments, which in most universities here form a large place in the curriculum.

## Non-specialised

Thus up to the time of taking a Master's degree the student will generally have obtained a wider background to his subject and it is not until taking a doctorate that any degree of specialisation may be made, when the student is judged on the result of a thesis, which should form a "contribution to knowledge".

It may be argued that the analytical approach of the United States' universities, to what is basically an experimental subject is not the best method of presentation.

In spite of the apparent enthusiasm among students, should it be necessary to study the subject from such a wide angle up to the end of the fifth year?

This indicates that the student will still be digesting fundamentals when by this stage in his career he ought to know which branch of engineering he will wish to follow.

# Continental methods may be worth study

SOME illuminating facts were revealed about continental methods of training apprentices by Mr. J. A. W. Deboo, group training officer of Baker Perkins, at the conference on Trends in Apprenticeship Training, sponsored jointly by the Industrial Welfare Society and the British Association for Commercial and Industrial Education.

It was questioned whether some firms, particularly smaller firms had a sufficiently positive approach to apprentice training. So often in the small firm a craft apprentice will be put alongside a capable craftsman, but it was seldom asked whether this man had the ability to transmit his knowledge and to impart skill, and if he was interested in youth.

In the larger firms this is partially overcome by employing specially trained instructors in a planned apprenticeship scheme.

However, the boy will have been considered, whatever the scheme, to have gone through a recognised apprenticeship from the national viewpoint, but his knowledge, skill, and enthusiasm for the job will vary greatly depending on the form of the initial training.

The Carr report says that the training of all should be brought up to the standard of the best if industry is to have entire freedom on how best to achieve this without Government intervention it may do well to look at some of the advantages gained from the continental methods.

### Craft syllabus

In Western Germany, for example the requirements of the various jobs, detailed syllabus of training, tests on the completion of apprenticeship and other factors are introduced which are specified by central authorities in respect of each skilled operation.

Much time is spent in analysing the syllabus for each craft.

The resultant syllabi cover all that the apprentice is required to know in order to practise as a craftsman, and it is realised that in future he may progress through various grades. He is not permitted, however, to commence initially unless he has satisfied the authorities by examination that he has a sound grasp of the practical and technical aspects of the craft.

In addition, there are now opportunities for adults up to age of 40 to train at special training schools on the Continent.

In Russian trade schools, only after a student has reached a minimum standard may he start his career as a qualified craftsman, although subsequently he may be promoted to higher grades of craftsmanship.

# BUSINESS COURSE

THE announcement by the Department of Economics at Sheffield University that it is to augment its business studies programme with a post-graduate course for arts and science graduates could not be more timely.

Whatever the outcome of the Common Market negotiations, Britain cannot afford to lag behind.

The new one-year post-graduate course will start in 1962. It will include economics, financial and cost-accounting, recent economic and social history, commercial law, use of statistics, and human relations in industry.

Another move is a proposal for a new degree in engineering to be combined with business studies.

# HEAT TRANSFER CLASS STARTS IN JANUARY

A COURSE of ten lectures will be given as an introduction to "The Mathematical Theory of Heat Transfer" on Tuesday evenings commencing January 16, 1962, at 6.30 p.m. at the National College, Southwark Bridge Road, London, S.E.1.

The lectures, which will be at post-graduate level, are intended for people presently engaged in heat transfer work, mathematicians and physicists.

The practical subject of heat transfer has applications to heating and cooling problems in nearly all branches of engineering, and it is currently of significance in the solution of problems in astrophysics, aeronautics, geophysics in addition to the basic field of engineering. Thus an indication of the utility of the mathematical results will be given, and the "bending" of the mathematical predictions to practical ends.

Immediately following the present course, there will be a fourteen-week course entitled "Experimental Techniques for Heat Transfer" which will delve more deeply into the various problems.

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RADIOISOTOPES IN INDUSTRY by **W. G. BUSBRIDGE,*** M.A., of the UKAEA

# Bulk irradiation may prove to have great advantages

*ATOMS were originally regarded as minute indivisible spheres. We now know that this conception is incorrect, and that the atom is in reality like a miniature solar system, with a heavy central body, the nucleus, round which orbit a number of electrons each carrying a unit negative electric charge.*

The number of these orbital electrons (the atomic number) characterises the element; thus the lightest element known, hydrogen, has one electron and the number of electrons extends to ninety-two, the atomic number of uranium, which is the heaviest atom found on earth.

Matter is mostly space, and the diameter of the nucleus is only a minute fraction of that of the electron orbits (or "shells"), so that to give the densities of matter with which we are familiar, the nucleus must have a density of about 50,000 tons per cubic millimetre.

## Nuclear 'bricks'

The nucleus itself is built up of two types of nuclear "bricks" of approximately equal weight; protons, equal in number to the orbiting electrons, and carrying a unit positive electric charge, and neutrons carrying no charge at all.

The nucleus is only stable when the ratio of protons to neutrons lies between certain limits. Outside these limits the nucleus is unstable and liable to disintegrate, in other words it is radioactive.

In the post-war applications of atomic energy, Britain has played a leading part in two main developments. One is electricity generation from nuclear power; the other the production on a commercial scale of radioactive isotopes, made by placing the common stable isotopes of chemical elements in the neutron flux of the atomic reactor.

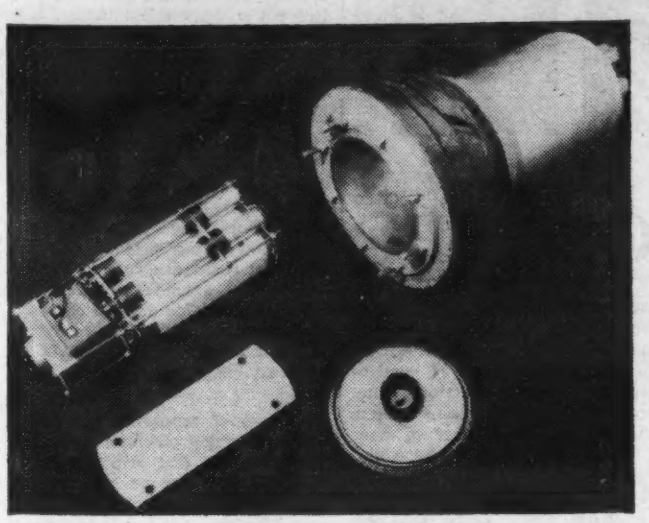
## Tracer techniques

Since the fission of uranium in an atomic power station gives rise to about 200 radioactive isotopes of about 40 different elements these two conceptions are closely allied.

Today the value of the British trade in radioisotopes is about £1,300,000 a year. More than half are exported, and their value is greater than that of the isotope exports of all other countries in the world combined.

Their true value is measured by the savings which they can achieve in industry, which is many times the value of the isotopes themselves.

**Sealing sulphur into tubs before irradiation in the atomic reactor. Under neutron bombardment the natural stable isotope sulphur 32 is transmuted into the radioisotope phosphorus 32.**



**This shows a recording assembly. As the mechanism passes a leak, it detects, through the pipe walls, the radioactive material which has leaked through, and the output of the Geiger tubes is recorded on the wire of the recorder. On playback into a chart recorder, the position of leaks is shown. A calibration for distance is made by placing outside the pipe solid radioactive sources at known positions along the pipeline.**

One gram of a typical radioisotope, Sodium 24, emits over three hundred thousand billion beta particles a second. These beta particles are capable of being detected individually by instruments such as the Geiger counter.

If we can detect one per second (which is not difficult to do) we can obviously detect or measure one three hundred thousand billionth of a gram of Sodium 24. Thus materials like this lend themselves readily to the tracing and measurement of flow and leakage in any kind of fluid system, from the flow of blood in the human body to the movement of silt on the ocean bed. Their application to every kind of industrial problem of flow or wear is apparent.

Radiation, like light, obeys the inverse square law, and is also attenuated and scattered in its passage through matter. Radioisotopes, therefore, lend themselves to the measurement of thickness by the change in the amount of radiation transmitted.

This permits accurate control of the production of any type of continuous sheet material without contact with the surface.

Thus the material can be measured while wet or white-hot and while in motion, and, in fact, in many conditions where normal micrometry and gauging are inapplicable.

Measurement of "back-scattered" radiation enables thickness to be measured from one side of the material only, and can be applied to instruments for measuring corrosion in pipes or boiler sheets, or to gauges for plating or coating thickness. The measurement of liquid levels in the cases of liquids which are hot (e.g. molten metal, or highly corrosive or volatile (e.g. liquified gases) is not easily achieved by conventional methods, but lends itself particularly to the use of radioisotope gauges.

The fact that radiation affects photographic emulsions leads to the use of a source of gamma-radiation as an inexpensive and trouble-free substitute for an X-ray set and one which, owing to independence of electrical power, may be used in remote locations or even under water.

Another photographic application is autoradiography, in which the position of radioactive material in plants, biological specimens or metallurgical samples is found by placing them in contact with a photographic emulsion.

## Ionisation

Radiation from radioisotopes has been used to ionise air to make it electrically conductive and allow the dissipation of electrostatic charges which are generated in the weaving of textiles (particularly in those made from synthetic fibres), and in the polishing and handling of plastic sheet materials. They are also used to produce initial ionisation for the starting of discharge tubes and fluorescent lamps.

Ability to detect gamma-radiation after passing through a substantial thickness of solid matter leads to the use of radioisotopes to signal the position of buried survey marks; the location of and the position of blockages in pipelines and drains, and to transmit the movement of rotors or vanes in tachometers and flowmeters.

## Activation analysis

By irradiating a sample with neutrons in the nuclear reactor, its component elements are made radioactive with characteristic energies and half-lives which are readily identifiable.

Such analysis has been used in metallurgical studies, in forensic work and in many other spheres, and allows some elements to be measured in trace quantities which are far below the limits of normal chemical and spectrographic methods.

The inception of the British nuclear power programme has made available a large number of reactors, and has made it possible to produce large amounts of radioactive isotopes cheaply, both by direct irradiation in the reactors and also by extraction from the fission products produced in the reactor fuel.

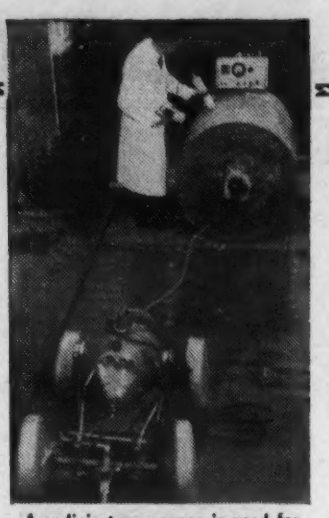
Radiation with its power to destroy living cells has been used to kill bacteria, insects and other unwanted forms of life. Sterilisation of surgical instruments, dressings, and sutures by radioactivity is now being used effectively on a large scale, such components being sealed in an impervious envelope which prevents reinfection.

A plant has been set up in Australia for sterilising bales of goat hair used in carpet manufacture, to avoid the incidence of infection which is sometimes carried on the hair and may affect operatives.

Radiation catalyses many chemical reactions, and may give a different yield or end-product. Much work is therefore proceeding on the polymerisation of oils, waxes, plastics and rubbers.

Disinfestation of grain and sterilisation of foodstuffs by radiation has been studied, but the former is associated with economic problems and the latter with troubles such as the spoiling of flavour, so that it may be some time before the treatment of food becomes an effective practice.

In agriculture work is proceeding on the production of plant mutations and of insect control, which may ultimately add to the world's food resources. There is no doubt that a large field of research in the effects of bulk irradiation lies ahead which may yield results of tremendous advantage to mankind.



**A radioisotope source is used for checking the welding of a fabricated pressure vessel. The isotope, which is normally carried in the shielded container in the foreground, is moved by remote control along a flexible tube into the pressure vessel.**

**Photos by courtesy of the UKAEA**

## Advice bureaux

The foregoing notes will, perhaps, have given an insight into the valuable uses of radioisotopes, which are already estimated to save the British production industry over £4,000,000 annually.

In the electrical field a large industry is growing, devoted to the measuring instruments required for radioisotopes, and to gauges and other process control instruments based on them.

An Isotope Information Bureau has been set up at the offices of the United Kingdom Atomic Energy Authority in Charles II Street, London, S.W.1, where information and advice are freely available. More detailed information is obtainable from the Wantage Research Laboratory in Berkshire, where problems can be studied in detail, and a team of field consultants is available.

The Radiochemical Centre, which supplies the vast range of radioisotopes now available as elements and as chemical compounds of many kinds is also in a position to supply technical advice.

It is to be hoped that full advantage will be taken of these aids to industrial production.

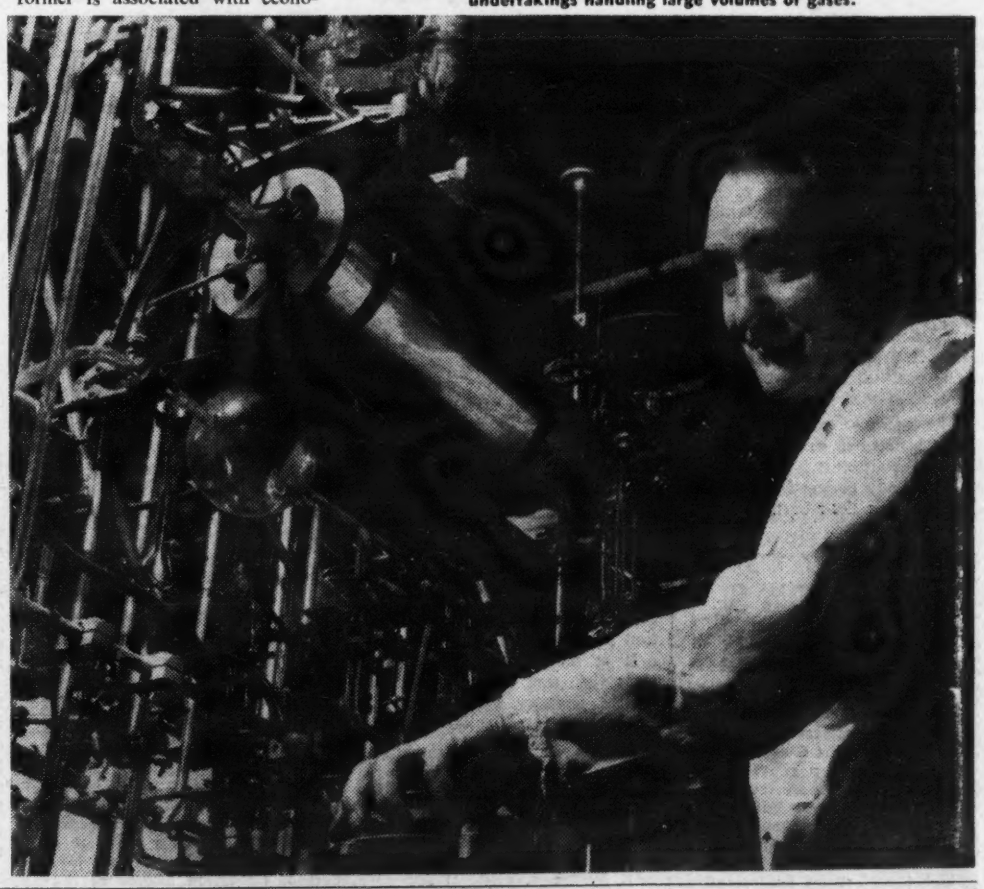
The Radiochemical Centre at Amersham is responsible for the sales of radioisotopes, labelled compounds and radiation sources.

In the face of expanding overseas production, the proportion exported last year was maintained at about 60 per cent, and the Centre had dealings with some 60 countries, the principal buyers being Federal Germany, the U.S., France, Canada and Japan.

The number of consignments despatched from Amersham and from Harwell was about 40,000, varying in size from a few millionths of a curie to 150,000 curies. The new laboratory at Amersham for handling alpha-emitting isotopes is now in full use.

** Mr. Busbridge is Industrial Liaison Officer of the Wantage Research Laboratory.*

**In this laboratory, radioactive gases are handled and separated. They have valuable applications to the study of leakage of sealed components, such as transistors, capsules or thermostats, and to the measurement of flow and mixing in chemical plants and other undertakings handling large volumes of gases.**



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**ENGINEERING NEWS**

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Thursday, December 14, 1961

# Dangerous design

It seems inevitable that engineers engaged in producing large and expensive capital equipment such as large ships, aircraft or nuclear power stations, must live in perpetual fear of suddenly being declared redundant.

The circumstances which make this necessary are usually beyond the control of the individuals concerned and are brought about by the fact that orders are large but few. Loss of one order can result in liquidation of the company or at best a cutting down of staff.

Earl Mountbatten, chief of the Defence Staff, recently advocated a reorganisation of Britain's aircraft design teams, on the grounds that there would be insufficient work in the future for the large number of design teams in existence. He suggested that some of these design teams should be disbanded and the remainder strengthened.

To some extent this kind of reorganisation is already under way, initiated by the aircraft companies for economic reasons, and as a result designers are being forced to find new jobs, perhaps in industries which are new and strange to them.

* * *

Two possible dangers arise. First, some of our best and most active aircraft designers may be forced out of the industry and, secondly, the likelihood that our progress in aircraft design, which at present is equal to anything to be found in the world, will slow down.

We have in recent years looked to the aircraft industry to point the lead in many new aspects of technology, such as use of new materials, high strength-to-weight structures as well as instrumentation and control. Most new developments like these start in the design office, and because so many ideas first tried in the aircraft industry have been taken up by other branches of engineering, the aircraft designer is in reality a great national asset.

The present trend is hardly likely to attract new recruits of high calibre, nor is it encouraging those already engaged in aircraft design to give their best.

# Tomorrow's technology

**Application of many new high-strength, thermal-resistant or refractory metals is limited by the difficulty of machining these alloys and the impossibly short tool life obtained.**

**An answer to these problems may lie in machining these difficult materials at high temperatures and recent research has shown that an increase in tool life of one hundred times is possible at 500 deg. C.**

**Increasing the temperature of the workpiece, say by r.f. induction heating, improves the efficiency of metal removal, and reduces the tool forces and work done in cutting. There is more than a chance that cermaic tools with their temperature resistant properties will find a sound application in hot machining. — SCANNER**

# An Engineer's DIARY

# HAILSHAM

It was . . . indeed . . . a very . . .

instructive . . . after . . . . . . noon

# UNDER THE MICROSCOPE

FROM the expressions on his face, Lord Hailsham must have found research into medical engineering at the Vickers Group Research Establishment, Sunninghill, near Ascot, as impressive as the field of rocket technology and other advanced sciences.

Lord Hailsham was greatly interested in a sealed-off six million volt X-ray tube for treating cancer and for industrial radiography.

He was told that research studies are being made by the medical section of the group into the mechanisms of respiration and blood circulation.

Two developments are a cylinder in which a man can breathe high pressure oxygen for treating carbon monoxide poisoning, and a blood pump for restoring blood pressure to normal immediately after a coronary "stroke".

After he had toured all the exhibits Lord Hailsham said: "It was an extremely instructional visit."

## Triumph for BR

WELCOME news from British Railways is the completion of the Liverpool-Crewe line electrification a month ahead of schedule. This has been achieved in spite of a long series of frustrating set-backs and delays.

This is a triumph of teamwork during a long and difficult period, and one of the top brains behind the scheme has been that of Mr. Ken Lord, London Midland Region electric traction engineer.

First trains to operate will run on New Year's Day, but it will be June, 1962, before the full service swings into action in time for the summer service.

Only time and labour-saving methods, which were the result of lessons learned from the Lancaster-Morcambe-Heysham trial scheme, have enabled the engineers to complete this mammoth undertaking ahead of time.

It was in this direction that Mr. Ken Lord contributed so much, for he has been "in at the birth" of a large number of electrification schemes all over the country.

It is more than twenty years since he was engaged on the Wirral Railway system, and he had a hand later in the inauguration of the Liverpool Street-Shenfield scheme before becoming Rolling Stock Engineer for the Manchester-Sheffield-Wath overhead electrification project.

He moved to Liverpool two-and-a-half years ago to undertake the Liverpool-Crewe electrification.

One of the biggest headaches the engineering staff experienced arose from fitting overhead structures in tunnels and cuttings between Edge Hill and Lime Street.

This involved cutting out "pockets" in the sand-stone walls, a job which had to be carried out mainly at night to minimise interference with the normal services in and out of Liverpool.

Another complication was caused by the lay-out of Edge Hill sidings, which are among the most complex in Britain. The speeding of London Midland freight traffic will be one of the earliest advantages gained from the scheme, which has involved the rebuilding or alteration of 60 overbridges and 14 underbridges. Major functional improvements have also been effected, and a number of new stations provided along the route.

## Fantasy or reality?

**IT seems that one more baking tradition has been shattered by the installation at Cadby Hall of a Baker Perkins oven which will bake slab cake as it travels through it.**

**I can forsee that more advanced techniques will invade the home, indeed, the process is already under way.**

**We have now reached a stage where the housewife can prepare a meal, put it in the oven, set a few dials and let it cook itself.**

**It is probable that there will eventually be a machine which gears the cooker to an ingredient selector and mixer. All the housewife will have to do is select ingredients in the quantities on the recipe.**

**This may cause Mrs. Beeton to turn in her grave, but in these days when the fair sex wish to spend more and more time outside the home the fantasy moves nearer to reality.**

## Gentleman farmer

THERE is to be a National College of Agricultural Engineering (see story page 20). I recently had the pleasure of meeting Dr. P. C. J. Payne, who at the age of 34 has been appointed the first principal of the college.

Dr. Payne has the appearance of a prosperous young gentleman farmer. He has, in fact, a strong family background of farming.

He was appointed Lecturer in Farm Mechanisation in the Department of Agricultural Engineering, King's College, Newcastle-on-Tyne, in 1960.

Dr. Payne told me that agricultural engineering has achieved the position of an intellectual discipline in its own right.

"It is," he said, "now in the stage that chemical engineering was in 15 years ago." The new college is, however, to be a centre for the training of practical agricultural engineers. "We want," said Dr. Payne, "this to be a muddy boot and oily hand sort of place".

## L-drivers

AT the other end of the academic scale, we have received news of a training school for farm machinery operators set up at Namalere, near Kampala, by the Special Development Section of the Uganda Agricultural Department.

Emphasis of the instruction is on machinery from the point of view of the African farmer. Priority for places on the courses is given to farmers who own tractors or who appear likely to buy one. No education standard is insisted upon for admission, although a knowledge of English is desirable.

The point of all this is that the men on whom the real future of mechanised farming in Uganda depends, the farmers who are determined to improve their work with modern methods, are now being given the training they need, even at the level of learning how to drive a tractor.

*John Heywood*

**The principal of the new National College of Agricultural Engineering, Dr. P. C. J. Payne, third from the left, makes a point at a recent press conference in London. On Dr. Payne's right are Mr. J. H. Brook, assistant secretary, Further Education branch of the Ministry of Education, and Sir Gilbert Flemming, chairman of the Governors of the College. On Dr. Payne's left is Group Captain K. M. Crick, the Registrar.**

# SOVIET ENGINEERING

*by our own correspondent*

# Moscow chief plans new power transmission

WHAT must be for power engineers the equivalent of the alchemist's dream of transmuting the base metals into gold, namely, the transmission of electric power by wireless means, is seriously proposed by no less an authority on the Soviet electrification programme than Professor V. Venikov, a Lenin Prize winner and the head of the electrical engineering department of the Moscow Power Institute.

Writing in the Soviet Government newspaper Izvestiya under the heading "The Future is being born now", the professor does not have radio receivers in mind but special antennae which are currently available and which can transmit considerable power over a distance of several kilometers with an efficiency of 50-60 per cent.

By way of supporting his case and overcoming potential sceptics, he points out that although this level of efficiency is not much in comparison with high-voltage transmissions, the position was very different at the time of the first experiments on the wire transmission of electric power by M. O. Dolivo-Dobrovolskii.

* * *

Another feature of the article is Professor Venikov's preoccupation with the question of economic cost. What this may mean and what indeed it has meant in terms of the Soviet economy may be gauged from the fact that it is envisaged that up to 80 per cent of the total electric power will be derived from thermo-electric power stations and not hydro-electric systems. This in spite of the unceasing propaganda in the Press delineating various features of the "largest in the world" (Bretsk) and "second largest in the world" (Stalingrad) hydro-electric power stations.

The question of economic cost as applied to transmission lines may well account for Prof. Venikov's interest in wire-less methods.

That all is not well here may be detected by anyone visiting the Soviet Union.

The deep parabolic arcs of the overhead transmission lines indicate that the materials used cannot be of high reliability.

This problem will become exacerbated in the near future, for it is required that by 1980 the high-tension network will grow from 140,000 km to several million and, according to the Professor, something must be done to economise on metal.

Similarly for reasons of economic cost, computers must be employed to secure a more balanced distribution of power.

* * *

Other aspects of the Soviet electrification programme also come in for criticism. The position of a.c. power transmission has not yet been clarified. Prof. Venikov writes: "It may turn out that over a 1,200 to 2,000-km line direct current is more suitable. But this question has not yet been solved because we have not yet undertaken a comprehensive study of the problem."

There is also an educational problem. One had supposed that the Russians had solved this one but it appears not to be so.

"We have three times more engineers in the United States," declares the Professor, "but the training of specialists for power engineering does not reflect the task of the future."

* * *

A new universal giant miller-borer for machining the stands of rolling mills is reported from the Efremov Factory for Heavy Machine Tools and Large Hydro-presses, Novosibirsk, Siberia.

The new machine tool NR-3 is capable of milling in various planes, boring, drilling and planing.

Some indication of its capacity may be inferred from the following: whereas rolling mill stands have hitherto been machined by five separate machine-tools, all operations can now be carried out on the NR-3. The machining time being reduced from 2-3 times.

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# TINNING LINE OUTPUT IS 1,500ft./min.

## Electronic controls record faults of strip in coil form

PROCESSING of steel strip by an electrolytic tinning line was recently started by Richard Thomas and Baldwin at Ebbw Vale. Steel strip up to 37 in. wide can be processed at a speed of 1,500 ft./min. Provision has been made for increasing the speed to 1,700 ft./min.

High speeds of the line introduce special problems, particularly for control and inspection. These are mostly overcome by using electronic equipment.

Shearing could not be carried out accurately on the line itself so two separate cut-up lines are installed to deal with the output of tinned sheet.

The tinning line is modelled on the Farrostan process of the United States Steel Corporation, and was built by the Head Wrightson Machine Co. in co-operation with a number of sub-contractors.

by
**Engineering News staffman**
DICK BELCHER

### Strip coiled

Electrical and electronic equipment was supplied by GEC and English Electric, and the complete busbar system was installed by British Insulated Callenders Construction Co.

Steel strip for the process is delivered to the tinning shop from the temper mill and is first passed to the coil preparation line. Here the strip is edge trimmed and built up by resistance welding into 36,000lb. coils.

Any sections of the strip which are outside limits for thickness are cut out at this stage and passed to a reject reel. Top speed of the preparation line is 4,000 ft./min., and the rated output is 300 tons a shift.

### Suspended loops

There are two pay-off reels at the entry end of the tinning line. They are motor-driven and while one is feeding the line, the other is being loaded with a new coil.

They are followed by a cut-off and welding section and the moving strip is suspended in three loops in a pit between the welding section and the process tanks.

This reservoir of strip allows coils to be changed and joined on without stopping the process. The looping pits are 80 ft. deep and the pinch rolls controlling the loops are 25 ft. above floor level.

From the looping pits the strip passes into the processing section where it is led under or over some 80 rolls as it is taken through the various plating and treatment tanks.

The processing part of the line is split up into a number of sections. Before plating, the strip is first led through the drag bridle—a series of motordriven rolls which control the tension in the processing section.

### Three tanks

A master drive bridle is situated at the end of the processing section, but in fact all the rolls are driven by variable speed motors to overcome inertia when speed changes take place and to prevent slip which might damage the surface of the sheet.

After the drag bridle come the cleaning and pickling tanks and a brush scrubber unit.

There are three plating tanks, and a total of 24 plating passes are available. The number of passes in operation will depend on the thickness of plating required and the speed at which the line is running.

Tin can be deposited at thicknesses varying between 0.006 in. and 0.0239 in., and it is possible to produce different thicknesses of coating on the two sides of the strip.

Replenishment of the tin anodes is a continuous operation. They are mounted on 48 bridge members running across the tank and are pushed from one side to the other by hydraulic jacks.

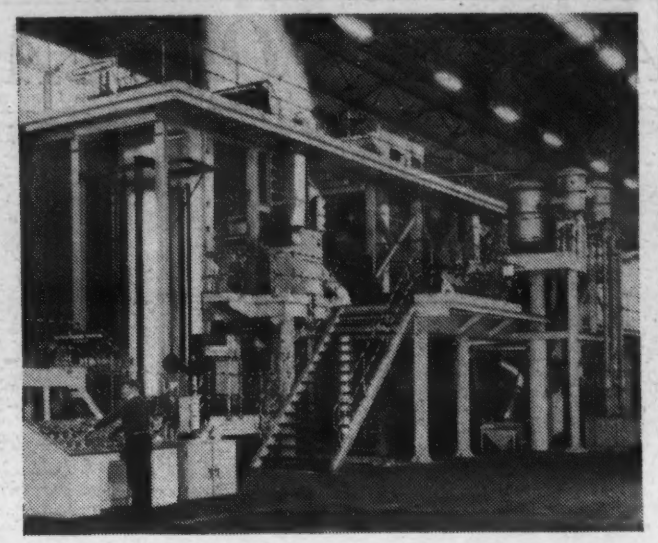
From the plating section, the strip passes through a marking unit (used to identify the thick or thin side of strip which has been differentially coated); a chemical treatment tank; electrostatic oilers; a melting section where the coating is heated above melting point and then quenched to improve the appearance; and an inspection station.

### Finishing checks

Visual inspection of the coating is necessary to detect lengths which have a poor appearance. The inspector has two stroboscopic viewing units to assist him in his task, and there is also automatic monitoring equipment to check for pin holes and variations in gauge.

These checks can also be carried out on the cut-off lines, and the sheets which are cut to length there are automatically graded into four piles: prime, pin holed, off gauge, or marred by surface defects.

If, however, the strip is to be delivered in coil form, it is possible for the monitoring equipment to supply a complete record showing what defects are present in the coil and where they occur.



**General view of the No. 2 electrolytic tinning line at Ebbw Vale. Elevated construction has been employed to give improved accessibility, and the operating platform is over 10ft. above shop floor level.**

## GIANT TANKER HOSE

SPACE-SAVING hose has been developed by the North British Rubber Company of Edinburgh for discharge or loading of oil tankers.

When in use it floats. Out of service it can be sunk out of the way.

It consists essentially of two parallel lengths of large diameter piping. One can be inflated with air to act as a float. The other carries the oil.

The floating pipeline has been developed for use with outsize oil tankers, carrying 100,000 tons and over.

Only two oil jetties in Britain (one at Finnart, Loch Long in Argyll, and the other in Milford Haven) can cope with these giant craft. In the Thames and the Mersey they have to lie at some distance from the shore.

A standing structure carrying a steel pipe normally blocks the seaway between the tankers and the shore. With the new sinkable hose all that is needed is a buoy near the anchorage.

The double piping costs approximately £20 a foot. About 1,500 feet have been bought by an Italian oil company.

## BRS BOGIE AIDS CORNERING

EASY negotiation of sharp bends and traffic islands is the purpose of the two-axle-in-line suspension bogies produced by Cranes (Dereham) for loads up to 35 tons.

Fitted with Michelin metallic G.20 tyres, the bogies have a hand steering mechanism giving 40 deg. rear steering in each direction.

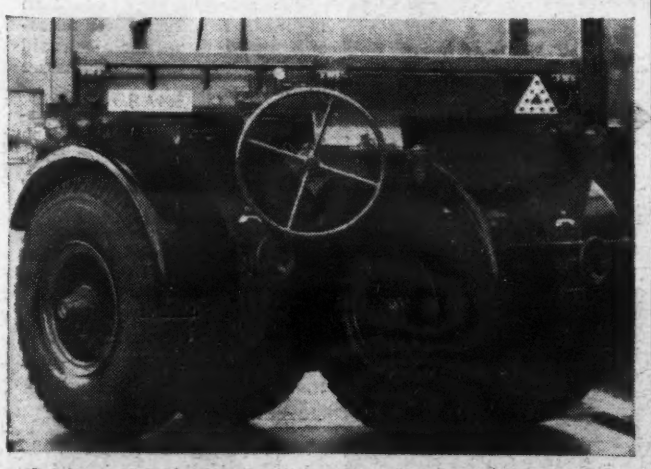
The loads connect the motive unit to the rear bogie by bolster and load location points at front and rear.

For normal running the rear bogie axles are locked in position at right angles to the fore and aft axis of the complete vehicle.

When the motive unit is running unloaded the bogie can be close coupled by the short central box section drawbar with the jockey wheel stabiliser in the stowed position.

Girling brakes are fitted and are operated by air pressure and controlled by a hand-wheel.

For articulation, two Crane ball-bearing turntables are incorporated in the frame which is fabricated from rolled-steel channel and plate.



**Extreme manoeuvrability when handling loads up to 35 tons is provided by these bogies manufactured for British Road Services. They help negotiate sharp bends such as traffic islands.**

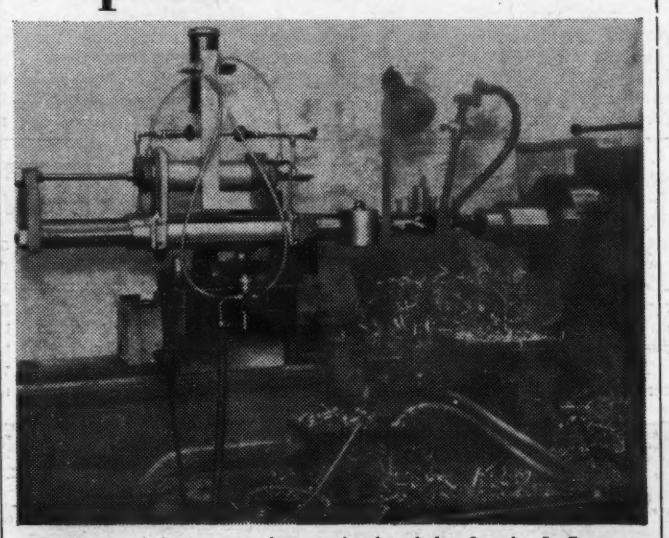
## CONGRESS AND EXHIBITION

SIMULTANEOUS translation into French, German and English will be provided at the Third Congress of the European Federation of Chemical Engineers (Olympia in June). It is planned as one of the most ambitious of its kind in the Commonwealth.

More than 2,000 engineers are expected to attend the four symposia at which 80 papers will be read.

Also at Olympia between the same dates — June 20 to 29 — will be the Second Chemical and Petroleum Engineering Exhibition.

## Boring attachment speeds lathework



**Drilling and boring attachment developed by Speedy & Eynon, Birmingham, mounted in place of the tailstock on a centre lathe.**

SPEEDY & EYNON, of Warstone Lane, Birmingham, have recently developed equipment for fitting to standard centre lathes which enables boring, drilling, and reaming to be carried out quickly and accurately.

The equipment takes the place of the normal tailstock and consists of a number of cylinders which are connected to a compressed air supply. These pneumatic cylinders feed the drill, reamer or boring bar at constant speed into the piece to be machined.

The unit is fitted with a quick return system for tool withdrawal. Feed rates are infinitely variable and are quickly and easily set.

In a recent application drilling a stainless steel billet it was found that the boring operation was reduced from 4½ hours by normal operation to 1½ hours by the use of the apparatus. The attachment can be manufactured to suit individual requirements and is easily installed by the works engineer.

## LUBRICANTS HYDROFINED

FIRST commercial unit to use the Ferrofining process for finishing lubricants recently came on stream at the Dunkirk Refinery of Societe Francaise des Petroles BP.

Ferrofining is BP's new catalytic hydrofining process. Essential feature is the specially developed catalyst. This enables hydrotreating to be used as a finishing process not only for solvent refined lubricants, but also for straight distillate lubricants.

## EX-PRESIDENT GIVES £1,000

THE Council of the Institution of Production Engineers has established a fund to enable an annual Award to the value of £50 to be made for the most significant contribution to production engineering in India.

This has been made possible by the generosity of Sir Walter Puckey, a past president of the Institution, who has donated £1,000 for the purpose of the award.

Candidates must be of Indian nationality.

## Symposium on sintered compounds

SINTERED, high-temperature compounds were discussed at a symposium on Friday organised by the Powder Metallurgy Joint Group which is formed from members of the Iron and Steel Institute and the Institute of Metals.

In dealing with hot pressing high-temperature compounds, Mr. J. S. Jackson (A.E.I., Rugby), considered that hot pressing can be applied to give high-density components of both bonded and unbonded compounds.

Impurities, non-stoichiometry, or very small additions of binders may profoundly alter the hot-pressing characteristics of certain materials.

He illustrated his remarks with: unbonded hard materials; those with a small amount of a cementing phase; and those with an appreciable quantity.

### Porosity measured

A paper by Mr. S. Amberg of Sweden outlined studies made on the sintering of molybdenum disilicide and alumina cermets.

The porosity of hydrogen-sintered bodies was measured as a function of alumina content and grain size and although coarse grained examples were more severely weakened by oxidation the oxide content was no greater than in fine grain specimens with their better performance.

Behaviour difference is thought to be due to the non-uniform distribution of oxide in coarse grain samples.

It was also found that specimens sintered in dissociated ammonia were severely attacked when exposed to air at high temperatures. This is thought to be due to the decomposing of silicon nitride formed during sintering.

A joint paper presented by P. Popper (British Ceramic Research Association) and D. C. S. Davies (Fulmer Research Institute) discussed the preparation and properties of self-bonded silicon carbide.

### Self-bond improved

Grading of the particle size of the silicon carbide was helpful, as was the percentage addition of colloidal graphite and appropriate pressing load.

Treatment at 2,000° C. for half an hour improved self-bonding.

The presence of liquid silicon during heat treatment was important, different results being achieved in vacuum as opposed to a reduced or inert atmosphere.

Three papers covered the structural aspects, mechanical strength, thermal-fatigue and applications of silicon nitride.

Another paper described a method for producing dense silicon nitride for use in gas turbines at temperatures up to 1,200° C. If the high creep-resistance of the pure material could be combined with the shock-resistance of a less pure sample the major problems would be solved.

.....FOREIGN NEWS.....FROM OUR OWN CORRESPONDENTS....

# $D_2O$ REACTOR FOR CANADA

## 20-MW plant will soon go critical

**TORONTO**

ATOMIC Energy of Canada's NPD-2 heavy-water moderated nuclear power demonstration reactor at Rolphton, on the Ontario side of the Ottawa River, is expected to become critical and commence generating power early in 1962. It has a designed electrical output of 20 megawatts.

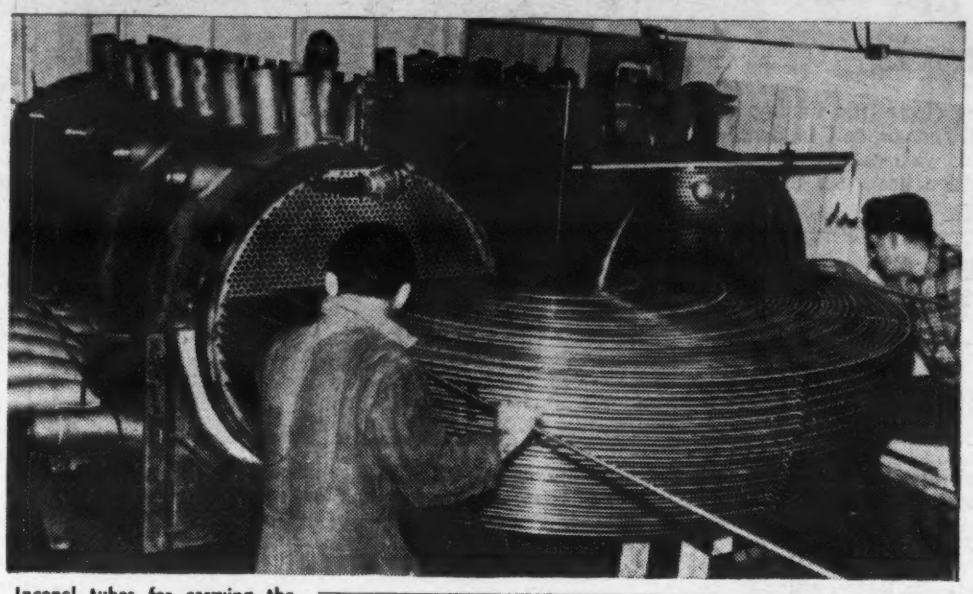
The reactor system employs natural uranium oxide as the fuel, heavy water near atmospheric pressure as the moderator and pressurised heavy water as a coolant. The plant consists of the reactor, the steam generator and the pumps needed to circulate the heavy water coolant through the reactor and boiler.

### Steam drum

Included with the boiler unit is a heat exchanger and steam drum with its associated "cyclone" steam separator of the natural circulation type. Evaporative capacity is 300,000 lb. of steam per hour at a pressure of 410 lb./sq.in.

The horizontal "U-shape shell and tube" type heat exchanger with steam drum was specially designed by Babcock-Wilcox and Goldie-McCulloch Ltd., Galt, Ontario.

Inconel nickel-chromium-iron alloy from the International Nickel Co. was specified for the heat exchanger tubing to prevent stress-corrosion cracking which could occur with other materials due to the presence of small quantities of chlorides at slightly acid pH, or local concentrations of alkalis.



**Inconel tubes for carrying the heavy water coolant being fitted into the special heat exchanger for Atomic Energy of Canada's NPD-2 nuclear power demonstration reactor at the plant of Babcock-Wilcox and Goldie-McCulloch Ltd., Galt, Ontario.**

## Tool heats tube ends

**PARIS**

A NEW plastics heating tool on sale in France is designed for heating the ends of tubing prior to mechanical forming.

It consists of a hollow aluminium cylinder which is electrically heated. The tool can be adapted to take tubes of different diameters by the insertion of interchangeable liners. Being light and robust, it is suitable for use on site.

The equipment is marketed by Ets. Vulcain, 29 bis, Av. Parmentier, Paris 11.

## WIRE WORKS

**WELLINGTON**

A large factory which will produce more than 40,000 tons of galvanised fencing wire a year—enough to meet the requirements of the whole of New Zealand—will soon be built at Otahuhu by Guest, Keen & Nettlefold (New Zealand). It is hoped to begin production early in 1963.

## Car glare stopped by crystal

**TOKYO**

A NEW device to eliminate the dangerous glare of oncoming motor car headlights — a major cause, of course, of night-time accidents — has been developed by Professor Daisaburo Yamaguchi of the Physics Section, Department of Sciences and Engineering of the China Prefectural National University. It involves polarisation of lights with Chilean saltpetre, sodium nitrate.

### Sandwich

The Professor has applied for patents on his polarising device in five nations, including the United States. Patents have already been granted in Great Britain, West Germany, and in Japan.

The Yamaguchi design consists of one ordinary sheet and one frosted sheet of glass, containing between them a single crystal of Chilean saltpetre glued in, in the manner of a sandwich. A set is attached in front of each headlight and another over a part of the windshield.

### Non-dazzle

According to inventor Yamaguchi, a car driver can look directly into the headlight glare of an oncoming vehicle without being dazzled by its headlights. The invention will therefore seem to render unnecessary conventional devices to lower headlights.

Compared with a similar Polaroid glass sheet now being used on streetcars in Boston, U.S.A., the device is said to permit four times more illumination. The intensity of the headlights may also be increased with the new device since it eliminates glare.

## Tool for deburring inaccessible holes

**DETROIT**

A SIMPLE tool, called the "Burrmite", for deburring the backs of inaccessible small holes less than 3/32in. dia., has been developed by Cogsdill Tool Products, Inc., Eight Mile Road, Oak Park, Michigan.

Operation is a simple in-and-out motion. As the rotating tool is advanced to the hole, tool design ensures deflection of its long shank to allow the cutting blade to enter the hole. Upon penetration of the hole, the shank straightens and the rear of the hole is deburred by the reversed lip of the tool.

Because the tool geometry is a function of workpiece dimensions, the Burrmite tool specifications must be calculated for each workpiece size.

In addition to deburring the rear of the hole, the tool also rubs the front side of the hole when it enters. Although not a strict cutting action, it is useful for holes accessible from one side.

## DRAWINGS ON MICRO-FILM

**HAMBURG**

A HAMBURG shipyard is now operating a micro-film and punched-card system for storing and printing the many thousands of drawings required for the ships under construction. For a medium-sized ocean-going cargo vessel some 2,500 to 3,000 original drawings may be required, and up to 50 prints of each drawing. Micro-film negatives are prepared from the original drawings or from photographic plates or roll films and then inserted in the punched cards in which they are stored.

## RAPID-CLAMPING CHUCK CONVERTS CENTRE LATHE

**BONN**

MANY lathes are so constructed that they can only take hand-operated chucks, but now, by fitting a chuck with built-in rapid-clamping movement, any type or model of lathe can be adapted to give economical clamping of work pieces.

Standard lathes can be converted to production machines for batch production, or for use in businesses which cannot set up special machines in addition to their normal lead-screw and draw-spindle lathes.

### Hollow cone

The new chuck, made by Dahn und Wittenstein, W. Germany, is mounted on the lathe spindle in the same way as a normal three-jaw chuck. The only extra fitting required is a support for the clamping lever, and this is fitted either on to the headstock or the lathe bed. Workpieces up to 18mm or 30mm diameter can be held in the chuck, and up to 70mm or 80mm diameter with special jaws.

The workpiece is clamped and released simply by operating the clamping lever, which is tilted sideways in order to leave the operator a clear working space. The rapid-clamping device operates the jaws via a hollow cone having a cylindrical guide section which moves axially in the enclosed chuck head.

### Accurate

The jaws themselves do not move axially, so that stop-controlled operations can be performed with great accuracy. Adjustable longitudinal stops can be fitted if required. All the chuck components are hardened and ground. The casing is completely proof against penetration of dirt and metal chips, but the jaws are fitted in such a way that they are easily interchangeable.

## European atom ship pact

**THE HAGUE**

THE European Atomic Energy Committee, EURATOM, and the Netherlands Reactor Centre have signed an agreement for immediate research and development in the nuclear propulsion of ships.

They will jointly carry out theoretical studies and practical experiments, largely in Holland, for the early development of a pressurised water reactor, thus continuing the research work done in Holland since 1957 aimed at producing a prototype. It is expected that this will be ready by the end of 1963.

### Critical tests

Dutch industry and Dutch universities will also participate in the general plan.

Critical experiments with the core of a ship's reactor will be carried on in Holland by the Centre for the next two years together with the development of fuel elements on the basis of uranium-oxide $UO_2$.

The total cost of the project will be from £1,400,000 to £1,700,000, of which EURATOM is in the first instance providing about £720,000. Dutch industry and the Dutch government are for the time being providing the rest.

## SPRAY GUNS GREASE HOIST ROPE

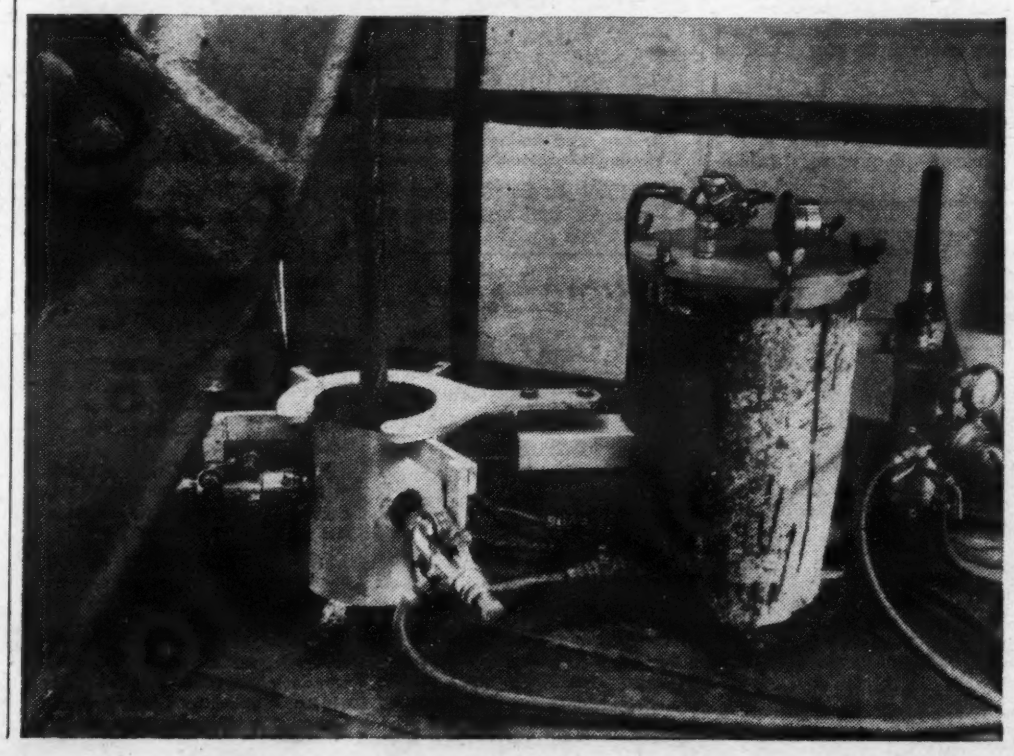
**JOHANNESBURG**

A NEW and speedier method of lubricating mine hoist ropes by means of sprays, instead of grease boxes, has been introduced in South Africa.

The Noxal Company of Johannesburg followed up reports that mine consulting engineers were interested in a method of lubricating their mine hoist ropes with a liquid dressing instead of heavy grease. The liquid dressing would lubricate the rope internally.

The company's engineers rigged up a mock headgear in the yard of their New Doornfontein premises and experimented with an Atlas Copco automatic spray gun, intended for mass production painting and for other industrial purposes such as oiling and wetting, and designed for automatic operation on a permanent mounting. These experiments gave them an indication of the spread of the oil.

On the instructions of the consulting engineers of the Van Dyk Consolidated Mines, Ltd., of Boksburg, the company installed their three spray guns rigged at 120 deg. angles to each other on a horse-shoe plate around the hoist rope on the No. 3 shaft of the mine. The unit was mounted immediately below the sheave, where whipping of the rope is at a minimum.



### Automatic

The automatic unit was then installed. It consists of micro-switches which operate a solenoid air valve to trigger the pressure to the sprays.

The automatic unit also contains a memory switch which records the number of trips done. After a certain number of trips, the memory switch locks the solenoid valve in the open position, but should the skip come to rest the micro-switches override the solenoid valve and cut it off. A recent test, in which the rope was examined 600 ft. from the end by prising open the strands, showed that the oil was penetrating the core.

**Three spray guns rigged at 120 deg. angles to each other around the hoist rope in a South African mine.**

## SWEDEN'S GENERATOR

**STOCKHOLM**

AN order has recently been placed with Turbin AB de Laval Ljungström Trollhätten for a generator of 275,000 kW for the new power plant at Stenungssund, Sweden. This is claimed to be the biggest underground steam power plant in the world and at present has a capacity of 320,000 kW. By 1965 it will have a generating capacity of 900 MW.

The steam vessel for the new station has been ordered from AB Svenska Maskinverken, Kallhall. Mr. Gosta Hallin, the director of the company, states that it is the biggest order they have ever received. It will amount to 30 million Sw.Kr. (about £2 million). Competition, especially from Switzerland, was very fierce.

# NEW Equipment

## Trimmer cuts in three dimensions

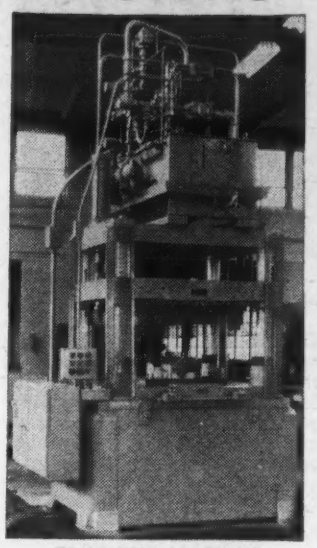
**THE oustanding feature of the new Model 3E-¼-10 trimming machine is its ability to trim parts in several planes; that is, a contour line in three dimensions can be followed all round the circumference of a stamping or drawn part.**

Basically it is a four slide single rotary cam machine for square trimming. Each slide has a movement of ¼in. horizontally and the four slides are positioned at right angles. Each slide is actuated at 90° to the previous stroke.

The standard machine has a stroke of the top slide of 10in. and will trim parts up to 5in. depth but machines with extended stroke for deeper parts can be supplied as specials. The horizontal movement of the four lower slides are very accurately controlled as to alignment making it possible to trim square contours, notches, tabs, and to pierce holes horizontally, from the inside outward, utilising the movement of the four slides.

The standard machine cycle is four seconds and the maximum tonnage is not to exceed 150 tons around the entire periphery, calculated without allowance for shear. The floor area required is 77in. by 50in. and working height above floor level is 42in. **The Embassy Machine & Tool Co. Ltd., 248 Watford Way, Hendon, London, N.W.4.**

**Reader service reference No. 354**



**TRIMMING MACHINE**
**Follows contours**

## Drying cabinet

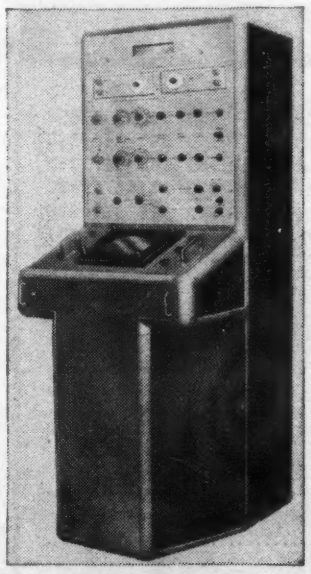
Air is circulated over the components to be dried in the cabinet by a propellor fan which is arranged to operate before the heater circuit is energised. On top of the unit, an exhaust ventilator is provided with a damper control which may be left to discharge warm air into the building or extended to exhaust air to the outside atmosphere.

Electrically heated with a rating of 10kW, the unit is thermostatically controlled for an operating temperature of 180/200°F. **A. E. Griffiths (Smethwick) Ltd., Bruce Street, Birmingham 21.**

**Reader service reference No. 355**

## Engine indicator

Designed for use in investigation and development work on internal combustion engines, the C.A.V. Engine Indicator has



**ENGINE INDICATOR**
**Measures accurately**

many applications outside the automotive industry where accurate measurements have to be made and it may also be used as a conventional oscilloscope.

The instrument displays the complete engine cycle from which measurements of pressure and movement can be made. It is suitable for use with resistive, capacitative and inductive pressure or displacement transducer. A range of transducers fully developed and proved for diesel engineering is available.

The indicator consists of a two-channel d.c. amplifier, engine sychronised time base, electronic camera shutter, degree marker and two independent beam cathode-ray tube display.

The time base is synchronised with engine revolutions by a probe attached to the flywheel and, when synchronised, the time base holds in step over a considerable speed range without alteration of the main speed control. **Rotax Ltd., Test Equipment Group, Chandos Road, London, N.W.10.**

**Reader service reference No. 356**

## Flatness tester

The improved Lapmaster Monochromatic Light enables surface flatness to be checked to an accuracy of one millionth of an inch by means of an optical flat.

This equipment, which incorporates a high-voltage transformer in the light head, may be used on the bench or fitted to a wall when tall components require examination. Requiring a power supply of 220/240V, 50/60 cycles a.c., the light head may be swivelled and locked in any position in a 200° vertical arc.

The light source is a series of four helium tubes and, in the event of damage, a defective tube may be bridged out of the circuit and the unit used until a replacement is fitted. No time is lost in reducing air wedge thickness above the surfaces to be tested and this also eliminates wear on the optical flat. **Payne Products International Ltd., Buckingham Avenue, Slough Trading Estate, Slough, Bucks.**

**Reader service reference No. 357**

## Ultrasonic unit

The Sonac is a versatile sensing and switching unit which can be used as a counting and sensing device, as a machinery safeguard for the operator, as an automatic door-opener and as a hopper and bin-level control as well as many similar uses.

The equipment comprises three major parts: a control unit containing a transistorised amplifier, a plug-in output relay and a power supply, and two hermetically sealed acoustic sensors.

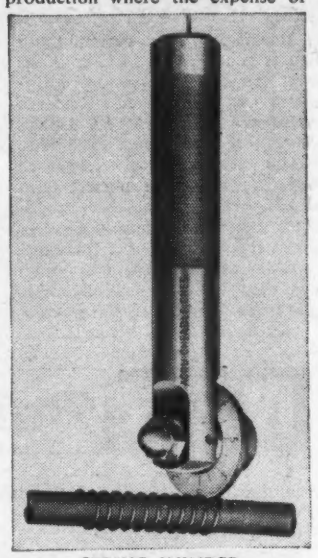
The two sensors convert electrical energy to ultransonic energy and vice versa. One acts as a transmitter and the other as a receiver. Electrical energy from the control unit is converted to ultrasonic energy, this is emitted by one sensor, received by the other, converted back to electrical energy and returned to the control unit. This provides circulation around a closed loop. An obstruction between the two sensors breaks the acoustic path and operates a relay in the amplifier unit. This relay operates the external function—counter, contactor, buzzer, etc.

The system will detect solids or liquids, opaque or tranparent, ferrous or non-ferrous metals. The acoustic beam may be several feet wide or will work through holes down to about 0.030in. in diameter. **Westool Ltd., St. Helen's, Auckland Co., Durham.**

**Reader service reference No. 358**

## Spring winder

The Acru hand held winder for forming coil springs, is particularly suitable for small quantity production where the expense of



**SPRING WINDER**
**Winds 3/16in. dia. wire**

setting up special machinery is not justified.

The wire is fed through the handle and between a steel disc and a plastic disc, which are then clamped together, and the pressure is varied according to the diameter and hardness of the wire.

The wire then feeds onto a rotating mandrel, the spacing between the coils being governed by setting a tapered disc to the spacing required.

A new plastic has been developed for the pressure disc which makes it much easier to control the pressure and to maintain it for longer periods.

The tool will wind springs from wire up to 3/16in. diameter and of a pitch up to 3/16in. **The Acru Electric Tool Manufacturing Co. Ltd., Acru Works, Demmings Road, Councillor Lane, Cheadle, Cheshire.**

**Reader service reference No. 359**

## Conveyor

The Trumasse is a fully enclosed, self-cleaning en masse conveyor which can be adjusted to suit individual length and inlet/outlet requirements.

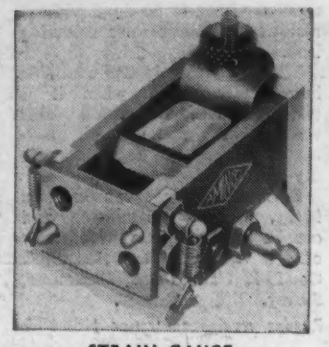
Available in two sizes, 8in. and 10in., with capacities of 1,200 and 1,800 cu. ft. per hour, stock is moved by a steel chain fitted with neoprene plastic flights.

Comprising drive and tail ends, trunking, inlet and outlet sections, chain and flights, the conveyor can be shortened or lengthened with ease to suit the particular process for which it is required. Various types of control for outlet slides can be provided. **Christy & Norris Ltd., Chelmsford, Essex.**

**Reader service reference No. 360**

## Strain gauge

The Aminco-Tuckerman optical strain gauge makes possible the measurement of strains due to tension and compression as small



**STRAIN GAUGE**
**(Above) extensometer, (right) autocollimator.**

as 0.000002in./in. on a wide variety of materials at temperatures up to 1,500°F.

Two basic units operate jointly to measure strain of hot, cold stationary or vibrating samples. The extensometer, fixed to the sample under test, is available in six lengths, with 16 different hardened steel knife edges for holding the extensometer to the sample and eight stellite lozenges, ground, lapped and polished to an optically flat mirror surface, which indicates the deformation or stress. The autocollimator is a precision telescope containing a light source.

In use, light from the autocollimator strikes the mirror system of the extensometer causing an image of the fiducial spot and line to appear in the autocollimator field of view. The position of this image on the graticule scale is a function of the lozenge rotation caused by a specimen deformation. Readings obtained can be readily converted to strain or deformation values by simple formulas.

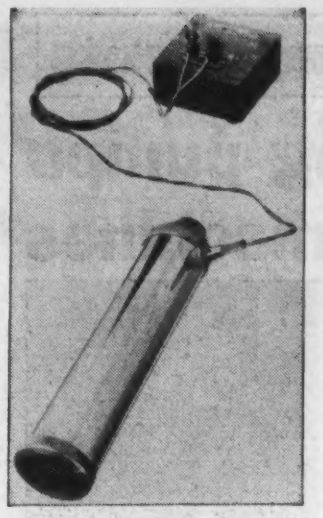
An accessory floor stand is available to permit universal movement of the autocollimator but it is possible to use the instrument by holding it or improvising a stand. **V. A. Howe & Co. Ltd., 46 Pembroke Road, London, W.11.**

**Reader service reference No. 361**

## Tractor trailer

This new 15cwt. capacity ground level on/off loading transporter fitted with extended, detachable sides if required, has many potential applications in all classes of industry.

Called the Eezion it was originally intended for the upkeep of parks and playing fields where it was required to carry sets of gang mower without using ramps or winches. In use, the base of the trailer lies flat on the ground during loading and unloading,



and a hydraulic lift unit raises the load ready for towing. **Ibbett Engineering Co. Ltd., Stanley Works, Ampthill Road, Kempston Harwick, Bedford.**

**Reader service reference No. 362**

## Grinding tool

A new version of the hand angle grinder type MSF676 is now available for grinding down and smoothing welding seams, and for fettling castings with a flexible roughing wheel.

It can be fitted with a variety of accessories for specific jobs such as removal of risers and casting funnels, and polishing over straight or curved sheet metal with a rotary rubber disc and abrasive fibre wheel.

The single phase a.c. and d.c. motor has a normal rating 1.25 h.p. and, according to type, can be geared from 4,300 to 8,400 rev./min. Weight is from 12.2 to 15.2lb. according to type. **Verrolec Ltd., 721 North Circular Road, Cricklewood, London, N.W.2.**

**Reader service reference No. 363**

## Welding control

Comprising a packaged ignitron contactor and four-stage non-synchronous timer installation, Lancashire Dynamo's Series NEC.2 multi-facility resistance welding control equipment has been designed predominantly for gun welder control but is equally suitable for operation with normal pedestal type spot welding machines.

The timing unit provides non-synchronous control of the "squeeze", "weld", "hold" and "off" functions and includes facilities for single or repetitive spot welding duty. Each of the timed intervals is independently adjustable.

The ignitron contactor unit is designed to accommodate ignitrons of the International size A, B and C, giving current switching capacities of approximately 100 to 580 amperes on a 50 per cent duty cycle.

The assembly is mounted in a wall-mounting cubicle, the overall dimensions being approximately 28in. by 26in. by 13in. **Lancashire Dynamo Electronic Products Ltd., Rugeley, Staffs.**

**Reader service reference No. 364**

## Pneumatic drills

Available in speeds of 500, 900, 1,500 revs./min. with a 5/16in. chuck for stainless steel, nimonic and other alloys, and 3,800 revs./min. with ¼in. chuck for general workshop use, the Grasso range of straight-grip pneumatic drills are designed for use at 85 lb./sq. in.

The chucks are shrouded for safety and almost silent operation, and the bodies are sheathed in easy - to - clean plastic which insulates the operator's hands from the cold metal.

Both basic sizes run at 8 cu. ft./min. and accept a ¼in. hose inlet. The up to 1,500 rev./min. model weighs 1¾lb. and the workshop model 1¾lb. **B. O. Morris Ltd., Morrisflex Works, Briton Road, Coventry.**

**Reader service reference No. 365**

## Battery tractor

The Floataire 1 H tractor is capable of towing three tons on level ground and is constructed of steel plates which have been electrically welded into one solid unit.

The drive is transmitted through the single front wheel which is directly coupled to the steering wheel and the steering assembly turns through a full 180° lock.

The power unit is housed under the chassis and allows uninterrupted floor space for the foot pedal control which gives three forward and three reverse gears.

Lockheed hydraulic brakes are fitted to the rear wheels and as an extra precaution, a hand parking lever, which operates independently, is also provided.

Power is provided by a 12 cell Kathanode traction battery, giving a maximum speed of 4.6 m.p.h., which can be supplied with a capacity of up to 429 Ah enabling continuous running for eight hours on one charge. **Floataire Ltd., Joseph Street, Leicester.**

**Reader service reference No. 366**

# NEW Materials

## Inorganic resins able to resist heat

INORGANIC resins based on a cross-linked phosphorous containing compound are now available for manufacturing purposes. The principal resin R346 is a solid material which is partially condensed but can also be offered in solution form. It is mixed with hexamine or formalin in a suitable solvent with the addition of a filler such as asbestos, and from this laminates can be prepared.

The properties of the laminates so produced vary according to the filler used and the curing conditions. It is possible to produce laminates of initial flexural strength 20-25,000 lb./sq. in. These might be suitable for temperatures as high as 500°C. The resins cannot at present be laminated into glass reinforcements and no information is yet available about low temperature properties.

Applications envisaged include, rocket and aircraft engine mountings, brake linings, abrasive products and uses in the electrical industry. **Albright & Wilson (Mfg.) Ltd., 1 Knightsbridge Green, London, S.W.1.**

**Reader service reference No. 367**

## Welded steel tube

Helically welded stainless steel tubing is made from strip, which is helically formed and continuously welded by a new process to a number of diameters between 3in. and 12¾in. outside diameter. Wall thicknesses vary between 18 S.W.G. and ¼in., and standard lengths are 20ft. and 30ft., although longer lengths can be produced to requirements.

During the manufacturing process, various electronic and mechanical devices control alignment, width of helical joint, angle, length of welding rod to fill the gap and arc length.

Joints in the tube, caused by coils of strip being joined, are scrapped from the completed tube and the ends of each length are cut square and ground. Metal samples for chemical analysis are taken from each coil strip used.

The tube is made in a variety of stainless alloys, nickel, monel, and inconel, and the manufacturing process ensures even wall thickness, true roundness and accurate diameter. **Welding Technical Services Ltd., Kings Norton, Birmingham 30.**

**Reader service reference No. 368**

## Insulating cushions

Stainless steel wire knitted together, crimped and rolled into a cylindrical cushion gives a variable damping rate mounting which provides a degree of vibration isolation and shock protection hitherto considered impossible or impractical.

Both spring rate and damping rate of change can be varied by the adoption of different mesh structures and by varying other parameters covering the fabrication of the cushions.

Strength limitation is established by the stress in the individual wire loops of the knitted mesh and, with the use of wire diameters of the order of 0.003 to 0.004in., such stress considerations hardly arise and extremely compact mountings to carry high loads are practicable in conjunction with a virtually indefinite life. **Delaney Gallay Ltd., Vulcan Works, Edgware Rd., Cricklewood, London, N,W.2.**

**Reader service reference No. 369**

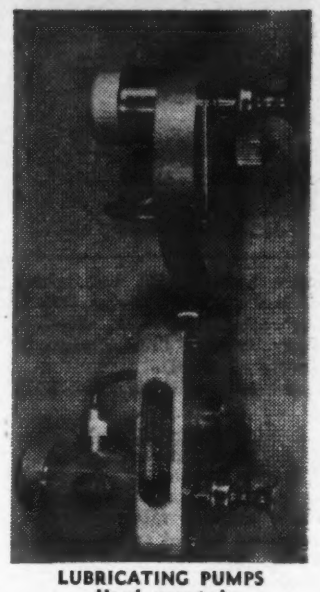
# NEW Components

## Lubricating pumps for small machines

**THESE two hand-operated oil pumps are designed for sump mounting on the machine to be lubricated, their flanges bolting on to the machine surface. They are ideally suited for small lathes and small textile machinery. The pump is of the spring discharge type, delivery being effected by raising the knob, which in turn raises the piston, and when the knob is released, spring pressure causes the automatic discharge of oil throughout the system.**

Two models are available. Type LM Special has a circular mounting flange of 3.125in. diameter and has a piston stroke of 5/16in. which discharges 0.565c.c. of lubricant per stroke at a mean pressure of 50lb./sq. in. Type LMH has a rectangular mounting flange 2 13/16in. by 1¾in. and with a piston stroke of ¼in., discharges 1.0c.c. per stroke at a mean pressure of 40lb./sq. in. **Tecalemit Ltd., Plymouth, Devon.**

**Reader service reference No. 370**



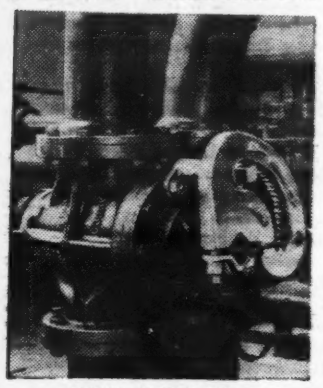
LUBRICATING PUMPS
Hand operated

## Valve gear unit

Produced for use with certain wrench - operated Audco valves, this light duty gear unit has been so designed that it may easily be fitted to valves already in service.

It has a cast iron quadrant which is clamped to the plug stem and, meshing with this is an Audcoloy pinion which is mounted on a stub shaft attached to the valve. Internal teeth have been used to give correct rotation and they require no lubrication as a better performance is obtained when used dry. **Audco Ltd. Newport, Shropshire.**

**Reader service reference No. 371**



VALVE GEAR UNIT
Easily fitted

## Miniature dashpot

The Kinetrol miniature dashpot will give the same qualities characteristic as the precision dashpot already in use and is completely free from stiction and leakage due to the unique type of shaft seal used.

Of the semi-rotary vane type, it is filled with silicone fluid so there is little variation of damping rate at high or low temperatures. No topping up or maintenance is required as the unit is sealed for life.

Chief applications are expected to be in the instrument and light mechanical field and any fixed damping rate between 0.01 and 5.0 lb. ins. per radian per second can be supplied. **Kinetrol Ltd., Trading Estate, Farnham, Surrey.**

**Reader service reference No. 372**

**Turn to page 19 for Classified Advertisements and read about . . .**

*Machinery for sale*
*Capacity available*
*Business opportunities*
*Agents and Trade Services*

## Steam trap

Believed to be the only one of its type on the British market, the Gestra Duo steam trap type BK15 with double control action is now being manufactured under licence in the U.K.

The function of this device is based on two principles, each of which is capable of discharging condensate and trapping steam on its own, but by working together they give the highest possible efficiency and reliability.

All internal members of this trap are manufactured from corrosion resistant stainless steel and are covered by three years guarantee. It operates in the pressure range 0-350lb./sq.in. and the body, which is made of forged steel, can be supplied with screwed connections or flanges.

Other Gestra traps, made in West Germany and based on the same principles, are available for pressures up to 4,000lb./sq.in. and for condensate loads of 500,000 lb./hr. **L. V. Pressure Controllers Ltd., 683 London Rd., Isleworth, Middlesex.**

**Reader service reference No. 373**

## Plug-in relay

Built onto an international octal plug made of a non-tracking material, the Guinea relay has two changeover contacts rated at 5 amps, 250V a.c. and a coil which can be for either a.c. or d.c. operation. It will perform at least 20 million operations with unloaded contacts and 2 million operations switching 750VA non-inductive per contact without any maintenance.

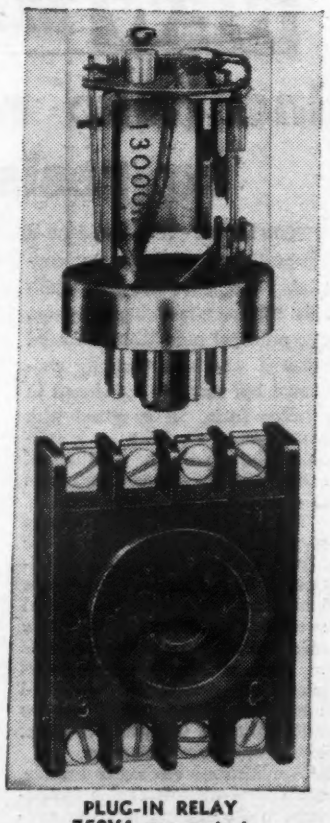
Usually, enclosed relays tend to soot their contacts after a long period of service and this is the limiting factor of their life. This relay, however, has a removable cover which enables contacts to be cleaned and the tension of the armature spring to be adjusted. The armature spring is made of stainless steel and the contacts are of the anti-arcing alloy, silver cadmium oxide.

Two accessories are available: one is a retainer consisting of a cap with two springs and eye bolts to hold the relay to the chassis when there is vibration or shock, the other is an octal socket with screw terminals which enables wiring to be done without resorting to the use of a soldering iron.

The same relay is also available hermetically sealed, when it is called the Double Guinea. This version has a metal cover, glass-to-metal seals and is filled with dry nitrogen.

Both these relays can be used in any position, will stand 8G and can be supplied in a wide range of coil voltages. **D. Robinson & Co. Ltd., Church Rd., Richmond, Surrey.**

**Reader service reference No. 374**



PLUG-IN RELAY
750VA per contact

## Thermometers

A mercury in steel actuated thermometer, Rototherm model 605, has a 7½in. vertical scale in place of the normal dial and, as each instrument is under 2in. wide, a bank of six can be put in a space 9½in. deep by 11½in. wide overall.

The range is within the limits of mercury — minus 30°F. to plus 1,200°F., each instrument is housed in a light alloy, hammer grey finish casting and the scale is covered by an unbreakable window. The standard copper-sheathed capilliary is 10ft. long with 6in. of stainless steel armour at head and back. Lengths of up to 120ft. of capilliary can be supplied.

With the thermometers in a compact bank, rapid comparisons of a number of readings can be made. **British Rototherm Co. Ltd., Merton Abbey, London, S.W.19.**

**Reader service reference No. 375**

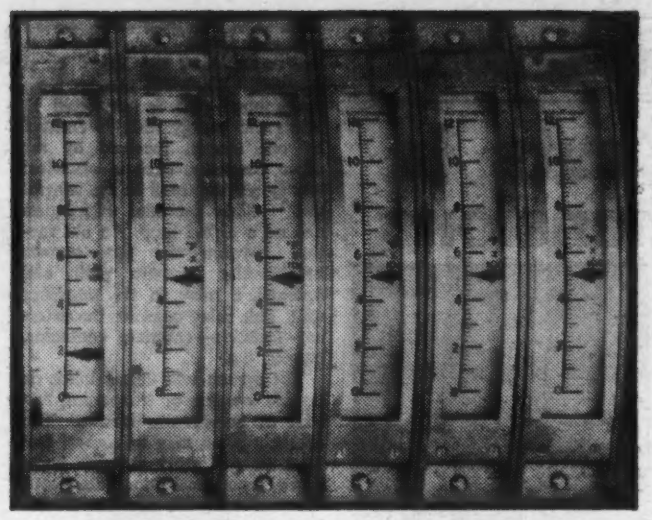
## D.C. solenoids

Witton-Kramer d.c. solenoids, for operating brakes on electric cranes, winches, hoists and similar types of plant in which the principle of solenoid operation can be employed, are designed to give their full rated output with a temperature rise not exceeding approximately 60°C.

The shell is of high grade cast iron, completely enclosing the coil, the fixed core is of high permeability steel, securely bolted to the top cover and the plunger is mild steel operating in a brass guide which forms part of the coil former.

Three types of winding are available: shunt wound, series wound for resistance control and series wound for potentiometer control. The three standard ratings are, normal duty, heavy duty and continuous duty.

When used for continuous duty, a switch and economy resistance can be incorporated to reduce the current taken after the initial pull has been obtained. **The General Electric Co. Ltd. of England,**



THERMOMETERS
Save space

**Engineering Group, Witton-Kramer Division, Birmingham 6.**

**Reader service reference No. 376**

## Transistors

Amazingly high current gain figures is the main feature of the new range of transistors introduced by Advanced Research Associates Incorporated. Beta values in the range 20,000 to 30,000 are claimed, compared with 50 or 100 for normal transistors, which means that one of these can replace several conventional types with resultant savings.

These devices have the advantage that they combine a useful power output with the high gain of a cascaded amplifier.

Four Germanium-Silicon types are available: NPN, PNP, PNN and NPP, each giving a dissipation of 10W, collector current of 3A and VCB of 30. These composites are essentially low frequency devices with a cut-off at 7kc/s. **Walmore Electronics Ltd., 11-15 Betterton St., Drury Lane, London W.C.2.**

**Reader service reference No. 377**

## Footage indicator

The Baldwin strip footage indicator provides a method of measuring the length of ferrous strip by printing and counting magnetic pulses. Accuracy claimed is plus or minus 1 per cent of total indication, up to 999,999 units can be recorded and a count-down facility is available for reverse mill operation. The range of mill speeds covered is between 2ft./sec. to 8,000ft./min.

A typical application is the measurement of finished steel strip whose thickness is sensibly constant. Electrolytic cleaning results in a magnetic field being set up and this is removed magnetically as it passes under a series of permanent magnets. Two coils, a print coil and a pick-up coil, are mounted over the strip, spaced according to the units employed, and after a manually initiated start pulse, each subsequent pulse to the print coil is triggered by the reception of a pulse at the pick-up coil so that the received pulses to the counting circuits are exactly one unit apart. **Baldwin Industrial Controls, Dartford, Kent.**

**Reader service reference No. 378**

## Miniature relay

The ElRemCo Type LB miniature relay for a.c. or d.c. operation, is available with one, two or three changeover contacts. Connections are brought to a moulded front plate together with those of the coil and they may be soldered or screwed in position. All base metals are plated, the coil is vacuum impregnated and the contacts are fine silver. The contacts are rated at 10A at 250V a.c. and 6A at 24V d.c. and the coil consumes a maximum of 6VA. Coils are available in a wide range of voltages. **Electrical Remote Control Co. Ltd., Elremco Works, Harlow New Town, Essex.**

**Reader service reference No. 379**

# NEW Publications

An illustrated booklet dealing with the **Douglas Automaster 22-ton Dump Truck** has just been produced by Thos. W. Ward Ltd. Sections covering the power units, gearbox, ram assembly and controls give technical information on the performance and a further section deals with the vehicle at work. A comprehensive specification and a drawing giving approximate overall dimensions are included.

**Reader service reference No. 380**

An illustrated catalogue of **Wind Direction and Velocity Instruments** is now available from Negretti & Zambra Ltd. The instruments detailed in this section of their range of catalogues are designed to measure wind at or near the surface of the earth. Instruments covered include anemometers, direction indicators, masts and roll chart recorders.

**Reader service reference No. 381**

A booklet, **ENEA Publications,** lists a number of publications available from the Organisation for Economic Co-operation and Development. The European Nuclear Energy Agency was set up in December 1957 to develop nuclear collaboration between the countries of Western Europe and a Steering Committee for Nuclear Energy, composed of representatives from all Member and Associated countries, is the controlling body of the ENEA.

The various publications deal with research into regulations for, economics of, and the markets for nuclear fuels, materials and equipment.

**Reader service reference No. 382**

The second edition of **Molybdenum Disulphide in Action,** published by K. S. Paul (Molybdenum Disulphide) Ltd., is now available.

It contains a number of reports on applications of this material on a wide selection of lubricating problems and gives a short review of the important technical points.

Also included are some extracts from scientific papers relating to molybdenum disulphide solid lubrication.

**Reader service reference No. 383**

A six page leaflet describing the TMC Extensible Line Connector No. 1 is now available. This system enables a full telephone service to be provided to up to 22 new subscribers over only four exchange lines.

Technical details of the equipment, its performance and component parts, as well as four typical trunking schematics, showing the extensible nature of the system, are also featured in this leaflet. **Telephone manufacturing Co. Ltd., Martell Road, West Dulwich, London, S.E.21.**

**Reader service reference No. 384**

The **Midland Resistance Co. Ltd.,** have just issued their 1962 catalogue of vitreous and wire-wound resistors from 6 to 180 watts in a variety of fittings.

Details of the ratings of tapped and fixed resistors, overall dimensions and extras available are included and the code identification system enables any catalogue number to be immediately tied up with the correct component.

**Reader service reference No. 385**

A 56 page catalogue by **Laporte Industries Ltd.,** lists nearly 300 chemicals manufactured by companies in the group and gives brief particulars of home and export packaging. As well as products of the U.K. companies, sections are devoted to products of subsidiaries in Australia, Canada and Germany.

**Reader service reference No. 386**

A brochure from **Sovex Ltd.,** is an introduction to the work carried out by this firm.

This publication illustrates and describes some of the diverse conveyor systems which they have installed and shows the various departments of their works where these conveyors are made.

**Reader service reference No. 387**

## READER ENQUIRY SERVICE

**December 14, 1961**

Please circle the reference number on the item on which you would like further details. Post to Reader Service Department, Engineering News, Drury House, Russell Street, London, W.C.2.

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BLOCK LETTERS THROUGHOUT

Your name .....

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Company's name .....

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Nature of business .....

ENGINEERING CONTRACTS

# BRITISH GEARS FOR POLAND

THREE Allen-Stoeckicht epicyclic gears for use on an axial-flow, multi-stage compressor in Tarnow, Poland, are to be manufactured by W. H. Allen Sons & Co., Bedford engineers.

Each gear will transmit 6,700 h.p. continuously and will increase the motor speed of 1,500 r.p.m. to the 6,600 r.p.m. of the axial flow compressor.

Ordered by Hawker Siddeley Brush Turbines, a member of Hawker Siddeley Industries, the three gears are part of a Polish order received by Constructors John Brown.

* * *

Bruce Peebles and Co., Edinburgh electrical engineers, are to carry out a £320,000 order for the Transmission Project Group of the Central Electricity.

The contract is for two outdoor closed-hydrogen-circuit water-cooled salient pole synchronous condensers (60 MVAr 13 kV 1,000 r.p.m.) which are to be installed at West Weybridge, Surrey.

These condensers will be capable of negative (under-excited or inductive) operation at an input rating of 30 MVAr.

### Pumps order

The Huish Episcopi pumping station of the Somerset River Board is to have three new 33in. vertical spindle, axial-flow pumps by Gwynnes Pumps, of London and Lincoln.

To be completed early in 1963, the contract includes supply and installation of switchgear, control gear, cabling, overhead travelling crane, penstocks, and syphonic discharge piping. The Huish Episcopi station will be automatically operated.

* * *

Associated Electrical Industries' heavy plant division have obtained contracts for large electric motors, at home and abroad, worth £150,000.

Among the individual orders is one for the Broken Hill company, South Australia. This plant includes two 1,500 r.p.m. 6.6 kV synchronous motors, one rated at 3,550 h.p. and one at 2,000 h.p., and three 700 h.p. 494 r.p.m. 6.6 kV squirrel cage induction motors.

The order came through Australian Electrical Industries Pty, the third to be placed by A.E.I.Pty for equipment to be used at tonnage oxygen plants.

### Printing presses

Through Fluor Engineering and Construction Co., the division has received an order from Svenska Esso A.B. for three 1,485 r.p.m. 10 kV drip-proof squirrel cage induction motors with ratings of 2,500 h.p., 5,000 h.p., and 9,000 h.p. These are for driving compressors in an Esso chemicals plant in Sweden.

Another AEI order, with the Motor and Control Gear division, is for the supply of electrical equipment worth £182,000 for nine Crabtree doublewidth printing presses for the "Birmingham Post and Mail".

* * *

Cladding of the main buildings at the English Steel Corporation's £26 million Tinsley Park project will have a coloured plastic surface finished in blue and buff with a light grey finish for the roof.

Robertson Thain, of Ellesmere Port, Cheshire, are to carry out the £400,000 cladding contract using Galbestos sheets which are made up of a steel core, a multiple layer of anti-corrosion coating, and the coloured plastic surface.

The sheet has a box rib profile which makes possible a bold surface appearance in scale with the buildings. Important maintenance factors are that the plastic coating will not need painting. Stainless steel fixings will also keep down maintenance costs.

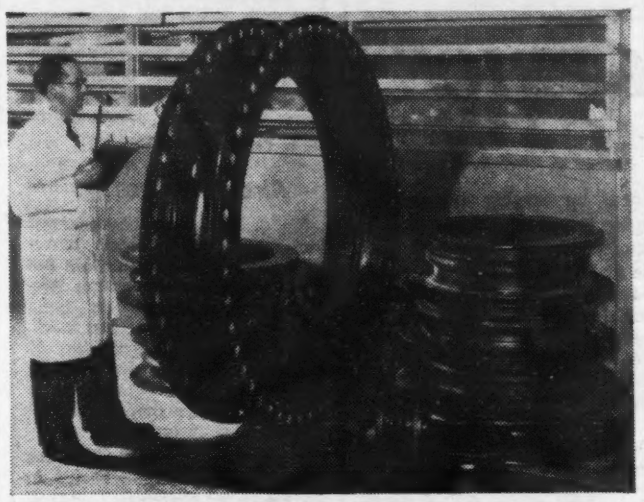
### £60,000 motors

Imperial Chemical Industries have ordered two synchronous motors from Bruce Peebles and Co. to drive gas compressors for ammonia production at the Billingham division's Severnside plant.

The largest yet built in Scotland, these two 59 h.p. 250 r.p.m. 11 kV unity power factor motors are to be designed for direct on-line starting with a current of four times full load.

Special equipment will be provided to facilitate the "phasing" of the outputs of the two six-cylinder compressors.

# ATOM-POWER JOINTS



**Thirteen extremely large expansion joints for the Canadian Atomic Energy Authority are to be produced by George MacLellan and Co., the Glasgow rubber firm. This order, and a similar contract for Indian power stations, was won against vigorous competition from U.K. and overseas countries.**

# Export opportunities

**AUSTRALIA:** Machine Tools. One high speed lathe, general purpose, 3in. to 4¼in. centre height, with accessories, generally similar to Myford Super 7B.

One power hacksaw, to cut material up to at least 6in. by 6in., complete with driving motor, power feed equipment and coolant system.

One rotating table, approximately 5¼in. in diameter with provision for tilting, generally similar to Capco model 3. One 20in. guillotine to cut 18 gauge mild steel sheet, foot operated.

Bids should be sent to the Comptroller, Stores and Contracts, Postmaster-General's Department, 114 Russel Street, Melbourne, C.1, quoting Schedule No. C8837. Closing date February 13, 1962. ESB 37233/61.

**AUSTRALIA.** Locomotives. The South Australian Railways Commissioner, Adelaide, has called for tenders for 12 diesel-electric locomotives, for general purposes. Specifications, drawings and conditions of contract may be inspected at the offices of the Agent-General for South Australia, 50 Strand, London, W.C.2. Closing date February 1, 1962. ESB 36643/61.

**CEYLON:** Hoists. One bus and truck hoist, two post, combined lifting capacity 22,500lb. maximum. One bus and truck hoist, single post, lifting capacity 13,440lb.

Firms interested should contact the Crown Agents for Overseas Governments and Adminstrations, 4 Millbank, London, S.W.1. Reference No. QEMI/Ceylon Transport 1134 should be quoted. Issuing Authority's closing date, January 3, 1962. ESB 36019/61.

**COSTA RICA:** Cables. Six cables of 15 kV, with three copper conductors of calibre 400 MCM, total length 345 metres (three cables of 55 metres each and three of 60 metres each).

Also two cables with a total length of 60 metres (one of 45 and one of 15 metres). Six terminal boxes (three phase) for interior installation and six for exterior installation (potheads) complete with the necessary accessories.

One cable of 40 metres of the same specifications as above and two terminal boxes for exterior installation (potheads).

Bids should be sent to the Instituto Costarricense de Electricidad, San Jose, quoting Tender No. 617. Closing date January 5, 1962. ESB 36904/61.

**Inquiries should go to the Export Services Branch, Board of Trade, Lacon House, Theobalds Road, W.C.1, before dates given. References (ESB) should be quoted.**

# VICKERS TAKE OVER

SIXTY per cent of the equity capital of All Wheel Drive, of Camberley, Surrey, U.K. manufacturers of the Clark Michigan range of construction machinery, is being bought by Vickers.

The remaining 40 per cent of the shares will be held by Clark Equipment International.

In future some of the Clark Michigan range may be made by subsidiaries and associates of the Vickers group.

From the start of the New Year the Michigan range will be sold and serviced throughout all the counties of England and Wales, except Northumberland, Cumberland, Westmorland, and Durham, by Jack Olding and Co., members of the Vickers group.

FINANCE AND COMMERCE

# CG & T PROFITS TOP £890,000

## Steel results hit by higher costs

MACHINE tool company results have been noticeably bright against a background of gloomy news from the under-employed steel firms. The implications appear to be that the machine tool makers are busy as capital investment in British and overseas industry continues, the steel firms are held back by the poor demand for cars and domestic appliances and the slack state of the shipbuilding industry.

Coventry Gauge and Tool has almost doubled its profits, to the new high level of £896,038, in the year ending August 31, 1961. This was despite a slight rise in depreciation and a more than twofold increase in the amount to be set aside for tax.

At the same time F. Pratt Engineering, a company who specialise in lathe chucks, were able to announce profits up to £287,000. The earnings of the company have risen from 35.6 per cent to 54 per cent.

The results from the steel companies, after the bright start from Firth & Brown, is no better than was expected.

In the year ending with this September the trading surplus of the United Steel Companies declined, after heavier depreciation, from £22.9 million to £16.8 million.

The total surplus after allowance has been made for certain items is £17.3 million, against £22.6 million.

Increased costs in force through the year are given by the USC directors as the main reason for the drop of £5.3 million in the total surplus.

Little compensation was received by the "inadequate" price increases permitted which covered only a small part of the year, and of the extra costs.

The fall in the rates at which plant was operating was a contributing reason, affecting only a relatively small part of the year.

John Summers and Sons and the South Durham Steel and Iron Co. also reported lower profits.

For John Summers, who are large producers of sheet steel, the trading profit dropped by more than £1 million to £13.2 million. The company is to maintain its dividend unaltered.

South Durham Steel and Iron, who are at the heavy end with plates and pipes, also suffered a cut in profits of over £1 million, to £7.1 million. The profit distributed to the South Durham shareholders is this year cut from £1,010,908 to £849,390.

TRADE AGREEMENTS

# STANLEY ABSORB BRIDGES

WIDELY known power tool firm, S. N. Bridges & Co., is to pass from the control of John Brown and Co., who have held a majority interest to Stanley Works (G.B.), the tool makers, whose parent company is Stanley Works, Connecticut, U.S.A.

Stanley have been best-known in Britain for their hand tools but the international concern has a wide range of activities and manufactures in five countries.

The British Stanley Works recently introduced into the U.K. a line of power tools which have an established position in the U.S.

Both Stanley and the Bridges company, which has built up a strong position as one of the big three British makers of light power tools, export actively, especially into Europe.

Under the new arrangement, which requires Treasury sanction, Bridges and Stanley will continue distinct manufacturing functions. The Bridges' management carries on in office under the leadership of Mr. G. N. Bridges, managing director who founded and built up the business.

Announcement of the agreement came from Lord Aberconway, chairman of John Brown and Co., and Mr. Howard L. Richardson, president of the Stanley Works, Connecticut.

### Pump sales pact

Reciprocating pumps produced by Joseph Evans and Sons (Wolverhampton) are now being marketed by G. & J. Weir, the principal manufacturing subsidiary of the Weir group.

The Kaman range of Pulsatron pulsed neutron generators is to be sold in Britain and the Commonwealth under an agreement concluded between Plessey Nucleonics of Northampton, and the Kaman Aircraft Corporation (Nuclear Division) of Colorado, U.S.A.

# Ford boost tractor sales in Europe

SHARPLY rising tractor output from the Ford, Dagenham factory is accompanied by a substantial increase in the proportion of the firm's sales in Europe. From the North, David Brown Tractors at Huddersfield, have improved sales of wheeled tractors to Europe in the first 10 months of this year by 42 per cent. At home David Brown Tractors have raised their sales by 13 per cent.

Total tractor output from Ford at Dagenham in the 11 months up to November 30 this year was the highest yet, 66,202. This compares with the 66,080 tractors produced in the same period of 1960, which was a 6.6 per cent improvement over 1959.

Export sales for the first 10 months of this year included 54.6 per cent of the total overseas sales going to Europe, against 43 per cent in 1960. Considerably increased sales have been made to France and West Germany.

Home sales in the first 10 months went up from the 16,000 of a year earlier to 17,000.

### EFTA sales

Overall export sales from Ford's declined by 2.4 per cent. A drop accounted for by falling sales to Commonwealth countries counteracting sharp improvements in other markets.

Sales of U.K. built Fordsons in the U.S. rose by more than 4 per cent in the period under review, from 4,359 to 4,542.

Sales to European Free Trade Association members increased by 19.1 per cent, to the European Common Market they rose by 46.3 per cent.

David Brown report that the interest taken by the public in new models at the Royal Smithfield Show has been the highest for years.

### German diesels

A cautionary note is added by the appearance at Royal Smithfield of the big Klockner Humboldt-Deutz West German engineering concern who have been showing a series of tractors powered by air-cooled diesels.

The British interests of KHD report that more than 40 orders could have been taken in the first two days but the primary purpose of coming over was to test reaction and to appoint a main concessionaire.

The air-cooled engine abolishes the danger of water leaks, of clogging the cooling system and of forgetting to protect against frost.

# Belfast wins ship order

A new-style assault ship for the Royal Navy is to be built at Belfast by Harland and Wolff, bringing a valuable construction contract to the none-too-busy Ulster shipbuilding centre.

For the assault ship—the contract is worth between £7 million and £8 million—six tenders at fixed prices were received, two of them from firms on the Clyde. In the past year naval ships worth £25 million have been contracted to Clydeside shipbuilders.

# Bagnall in Europe

A COMPANY aimed at co-ordinating European operations has been formed by Lansing Bagnall, the battery electric fork lift truck and industrial tractor manufacturers.

The new company, Lansing Bagnall International, is to be based in Glarus, Switzerland. Forty per cent of the company's output is sold overseas, half of this total in Europe.

A Board member of the new company is Dr. Karl Kobelt, former President of Switzerland, who qualified as an engineer at the Federal Institute of Technology, Zurich, and holds his doctorate in engineering.

# EXTENSION IN NIGERIA

AN important part in the domestic building programme of Nigeria is being played by the Crittall-Hope (Nigeria) factory producing standard metal windows and doors and a variety of pressed metalwork.

Now a second factory extension is to be built, increasing capacity by 50 per cent. The original factory began production in November, 1958 and was doubled in size less than two years ago.

The official Western Region Development Corporation of Nigeria are shareholders in the Crittall-Hope company.

# EEC MOVE DISCUSSED

THE differing levels and methods of taxation in West Germany and in Great Britain were discussed by Mr. Cyril Harrison, President of the Federation of British Industries and other members, and leaders of the Federation of German Industry, in London last week.

Britain's prospective entry into the Common Market was the chief subject of discussion between the members of the industrial organisations.

Unanimous agreement was said by an FBI spokesman to have been reached on the necessity of finding solutions which both preserve the aims and principles of the European Economic Community and do no harm to Britain's relations with Commonwealth countries.

The desirability of a common policy was recognised in certain trade policy fields, which included East-West trade and the imports of low cost manufactured goods.

## FINANCE AND COMMERCE

# 600 GROUP BOOSTS EXPORTS

A NEW level of success in machine tool exports has been reached by the Colchester Lathe Co., one of the George Cohen 600 Group. More than 60 per cent of the company's total production is now going overseas.

Producing the internationally known family of Colchester precision centre lathes, the company are currently maintaining an output of more than 3,500 machines a year.

Rising overseas demand is expected to cause the allocation to exports of the greater part of the expanded production which will be made possible when the present extensions to the Colchester factory are complete.

The ability to compete against heavy opposition is underlined by increasing sales in North America, West Germany and Japan. An important element in this success is after-sales service.

# Aero-engines may find 1961 a record year

## EXPORTS MAY BE MORE THAN £84m

AERO-ENGINE exports this year look like exceeding by a substantial margin the record total achieved in 1960. When the yearly figures are announced in the New Year the increase is likely to be one of some 15 per cent.

1960's aero-engine exports were worth £73.7 million.

In the first ten months of this year they reached a value of £70.5 million, an estimated annual rate of £84.6 million.

British aero-engine sales are based on a wide range of power units. The Rolls-Royce Dart turboprop powers the Vickers Viscount and other British and foreign aircraft.

The Dart, Tyne, Avon and Conway engines, all from Rolls-Royce, are used on, or ordered for, more than 1,150 civil aircraft.

In military air forces 30 types of aircraft in service with, or ordered by, 28 countries have a specification for Rolls-Royce engines.

Bristol Siddeley, the other giant of the British aero-engine industry, has its engines on almost 1,000 civil aircraft.

One of the great hopes of the company is its family of turbofan engines, the first of which to go into an aircraft is the BS 53 in the experimental Hawker P.1127.

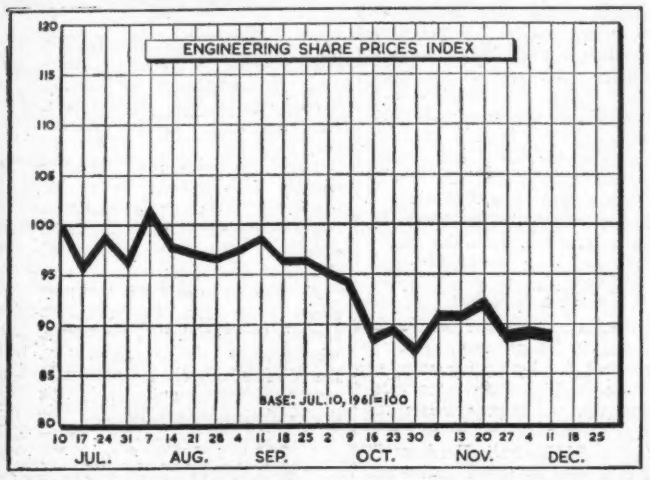
The special value of aero-engine exports lies in their high skill and labour content in relation to raw material costs plus the value of spares which in the course of an engine's operational life amount to about twice the initial cost.

A predictable income from spares, and possibly service, flows for up to ten years from the original sale of a particular engine.

After its two big firms, the aero-engine industry has two smaller concerns, Alvis and Napier Aero Engines. The famous Alvis Leonides piston engine is in service in its thousands around the world. Supplying the spares and overhaul facilities will be a substantial business for years ahead.

Napier Aero Engines are owned jointly by Rolls-Royce and D. Napier and Son. Their Napier Eland turboprop engines are installed in 25 formerly piston-engined US and Canadian Convair airliners.

Westland Wessex helicopters of the Royal Australian Navy are to be equipped with Napier's Gazelle turbine engines.




# TITANIUM PRICE IS CUT AGAIN

THE price of titanium has been cut by varying amounts of between 10 and 15 per cent, bringing the cost of this metal of many applications to less than half its level of six years ago. The latest price cut will operate from the end of the year.

Jessop-Saville, the Sheffield special steels firm who are the Birmingham Small Arms steel division, who have made the reductions, began commercial production of titanium in 1955.

They have lowered their prices on five earlier occasions. "Production technique improvements and rising output", Mr. J. F. Wallace, sales director of Jessop-Saville told Engineering News, "are cutting our costs of production and we are passing on the savings to the customers".

First developed for the aircraft industry, for which its combination of strength, lightness and corrosion - resistance had special value, titanium is now used in a wide range of equipment, a range likely to grow as the price falls.

## Busy bus firms

The AEC group is to send 14 chassis from its South African subsidiary to the Durban Corporation. The same local authority has also ordered a £70,000 fleet of single-deck buses from Leyland Motors.

## ENGINEERING NEWS SHARE PRICES TABLE

| 1961 High | 1961 Low | Stock | Dec. 11 | Ch'ge | Y'ld p.c. | 1961 High | 1961 Low | Stock | Dec. 11 | Ch'ge | Y'ld p.c. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 47/9 | 29/9 | Allen, Edgar (£1) | 29/9 | –1/3 | 8.9 | 57/- | 44/9 | Lister, R.A. (£1) | 53/6 | –1/- | 5.3 |
| 43/- | 24/9 | Allen, W. H. (£1) | 25/6 | +9d. | 7.7 | 51/9 | 36/- | Mather & Platt (£1) | 36/- | –1/3 | 6.0 |
| 77/- | 58/6 | Angus, George (£1) | 67/6 | ... | 5.9 | 67/- | 46/- | Metal Industries (£1) | 52/- | –1/6 | 5.6 |
| 31/10½ | 19/- | A.P.V. (10/) | 30/6 | –6d. | 3.6 | 71/3 | 53/4½ | Morgan Crucible (£1) | 57/3 | –2/- | 4.8 |
| 14/1½ | 8/10½ | Asquith Machine Tool (5/) | 9/6 | –6d. | 2.5 | 31/- | 16/7½ | Morris, Herbert (10/) | 16/7½ | –4½d. | 8.2 |
| 48/6 | 29/- | Assoc. Electrical Ind. (£1) | 29/6 | –9d. | 10.0 | 52/- | 37/3 | Murex (£1) | 40/- | –6d. | 6.4 |
| 16/5 | 11/8 | Assoc. Engineering (5/) | 13/7½ | –1½d. | 4.8 | 49/6 | 40/6 | Neepsend Steel (5/) | 41/- | –3d. | 6.0 |
| 110/- | 83/- | Averys (£1) | 95/3 | +6d. | 3.1 | 31/6 | 20/3 | Newton Chambers (5/) | 20/3 | –1/9 | 4.8 |
| 36/9 | 20/- | Babcock & Wilcox (£1) | 21/- | –6d. | ... | 41/3 | 20/7½ | Parkinson Cowan (£1) | 20/7½ | –10½d. | 8.4 |
| 59/6 | 40/6 | Baker Perkins (£1) | 44/3 | –9d. | 5.0 | 72/9 | 47/- | Parsons, C. A. (£1) | 51/6 | –1/- | 4.8 |
| 9/7½ | 5/10½ | Beyer Peacock (5/) | 6/9 | –6d. | 8.5 | 40/3 | 38/- | Plessey (10/) | 44/6 | –1/6 | 3.3 |
| 77/- | 45/- | Birfield (£1) | 66/6 | +1/3 | 3.0 | 33/- | 16/- | Pressed Steel (5/) | 17/3 | –3d. | ... |
| 102/10½ | 60/6 | Birmid Industries (£1) | 60/6 | –4/- | 6.5 | 25/3 | 19/9 | Qualcast (5/) | 21/1½ | –1½d. | 4.2 |
| 36/10½ | 18/6 | Birmingham Small Arms (10/) | 18/6 | –4½d. | 6.2 | 38/1½ | 22/3 | Radiation (£1) | 24/1½ | –4½d. | 8.1 |
| 45/6 | 33/6 | Brockhouse, James (£1) | 41/4½ | +4½d. | 6.0 | 22/6 | 14/- | Ransome & Marles (5/) | 15/3 | ... | 4.4 |
| 28/9 | 21/1½ | Broom & Wade (5/) | 21/1½ | –1/1½d. | 5.3 | 28/6 | 22/6 | Ransomes, Sims & Jeffs (£1) | 24/9 | +3d. | 6.0 |
| 42/6 | 29/9 | Brotherhood, Peter (10/) | 31/3 | –6d. | 7.8 | 50/6 | 34/6 | Renold Chains (£1) | 44/9 | –3d. | 4.4 |
| 48/9 | 30/4½ | Brown, John (£1) | 33/3 | +1/- | 6.5 | 52/3 | 38/- | Reyrolle, A. (£1) | 42/3 | –3d. | 4.6 |
| 8/6 | 4/3 | Cammell Laird (5/) | 4/6 | +3d. | ... | 9/1½ | 3/4½ | Richardsons Westgarth (10/) | 3/4½ | –6d. | ... |
| 39/6 | 24/3 | Carrier Engineering (5/) | 24/3 | –6d. | 5.0 | 9/3 | 4/3 | Roberts, Charles (5/) | 4/3 | ... | ... |
| 54/3 | 35/6 | Clarke Chapman (£1) | 35/6 | –9d. | 7.6 | 48/6 | 35/6 | Rolls-Royce (£1) | 35/6 | –10½d. | 6.1 |
| 14/9 | 9/6 | Cohen, George (5/) | 9/9 | ... | 6.3 | 32/6 | 20/- | Ruston & Hornsby (£1) | 20/- | –3d. | 8.7 |
| 33/10½ | 21/8 | Coventry Gauge & Tool (10/) | 31/- | –1/6 | 4.6 | 19/3 | 12/3 | Serck (5/) | 12/10½ | +4½d. | 4.8 |
| 12/3 | 7/3 | Craven Brothers (5/) | 8/- | –4½d. | 5.2 | 23/9 | 9/3 | Shaw, Francis (4/) | 9/3 | –3/1½d. | ... |
| 24/- | 17/6 | Crofts Engineers (5/) | 21/- | –3d. | 4.0 | 12/- | 7/9 | Sheepbridge Engrg. (5/) | 8/6 | ... | 8.3 |
| 39/7½ | 30/- | Davy-Ashmore (5/) | 30/9 | –1½d. | 4.4 | 32/4½ | 19/1½ | Simms Motor (5/) | 23/6 | –9d. | 3.7 |
| 70/- | 44/3 | De La Rue (10/) | 51/- | –3/- | 4.3 | 44/1½ | 29/7½ | Simon Engineering (5/) | 31/- | –1/- | 4.3 |
| 27/7½ | 19/9 | Delta Metal (5/) | 20/3 | –3d. | 4.8 | 23/9 | 13/9 | Smith, S. & Sons (4/) | 15/9 | ... | 5.0 |
| 68/9 | 50/- | Desoutter (5/) | 60/- | ... | 2.8 | 15/3 | 11/- | Solar Industries (5/) | 11/3 | ... | 7.7 |
| 41/3 | 29/6 | Dowty Group (10/) | 29/7½ | +1½d. | 5.2 | 45/7½ | 22/6 | Staveley Industries (£1) | 25/- | +2/6 | 8.6 |
| 32/10½ | 22/4½ | Edwards High Vacuum (4/) | 31/10½ | +3d. | 1.9 | 32/6 | 18/6 | Steel & Co. (5/) | 30/7½ | –3d. | 3.6 |
| 52/- | 35/3 | Elec. & Musical Ind. (10/) | 44/- | +3d. | 3.9 | 67/- | 38/- | Stone-Platt Ind. (£1) | 42/9 | +9d. | ... |
| 40/3 | 25/9 | Elliott-Automation (5/) | 39/3 | –10½d. | 1.7 | 20/4½ | 14/- | Tecalemit (5/) | 16/3 | –3d. | 5.6 |
| 40/6 | 24/- | English Electric (£1) | 24/- | –1/3 | 8.2 | 17/4½ | 10/6 | Thompson, John (5/) | 10/6 | –6d. | 2.3 |
| 37/3 | 21/6 | Firth Cleveland (4/) | 21/6 | –1/3 | 5.9 | 7/- | 4/- | Thornycroft, John (4/) | 4/3 | +3d. | 8.1 |
| 39/6 | 24/3 | G.E.C. (£1) | 24/3 | –9d. | 8.4 | 17/6 | 11/6 | Toledo Woodhead (4/) | 15/3 | +3d. | 5.1 |
| 65/- | 46/3 | General Refractories (10/) | 46/3 | –1/6 | 5.3 | 85/6 | 55/- | Tube Investments (£1) | 60/6 | –2/6 | 4.6 |
| 66/6 | 46/3 | Glenfield & Kennedy (£1) | 46/3 | ... | ... | 38/4½ | 25/6 | Vickers (£1) | 26/6 | +1/- | 7.4 |
| 108/7½ | 70/- | Guest, Keen & Nettlefold (£1) | 70/- | –4/- | 4.5 | 157/6 | 122/6 | Walmsley (Bury) (£1) | 128/1½ | –4/1½d. | 3.4 |
| 48/7½ | 26/6 | Haden, G. N. (5/) | 30/6 | –1/6 | 3.1 | 84/6 | 59/6 | Ward, Thos. W. (£1) | 59/6 | –3/6 | 4.6 |
| 16/6 | 12/1½ | Hall-Thermotank (5/) | 12/6 | ... | 4.4 | 17/9 | 10/1½ | Weir, G. & J. (5/) | 12/- | +9d. | 7.3 |
| 24/- | 13/4½ | Harland & Wolff (£1) | 13/7½ | +3d. | 7.1 | 47/6 | 27/3 | Wellman Smith Owen (5/) | 27/3 | –1/3 | 3.9 |
| 33/3 | 21/6 | Hawker Siddeley (£1) | 21/10½ | +4½d. | 9.6 | 14/1½ | 9/9 | West, Allen (5/-) | 9/9 | –1½d. | 6.7 |
| 31/- | 19/- | Head Wrightson (5/) | 19/- | –1/3 | 4.1 | 46/3 | 23/6 | Westinghouse Brake (£1) | 23/6 | –3d. | 9.2 |
| 79/9 | 51/6 | Herbert, Alfred (£1) | 62/6 | –1/3 | 4.4 | 36/6 | 18/- | Whessoe (5/) | 18/- | ... | 7.4 |
| 95/6 | 70/- | Hick Hargreaves (£1) | 70/- | ... | 5.8 | 17/- | 12/- | Wilmot-Breeden (5/) | 14/3 | –3d. | 3.9 |
| 138/9 | 101/3 | Hopkinsons (£1) | 110/7½ | ... | 4.9 | 30/- | 18/9 | Woodall-Duckham (5/) | 18/9 | –9d. | 5.5 |
| 25/- | 18/6 | Howden, James (5/) | 19/3 | –9d. | 6.3 | 64/9 | 44/6 | Worthington-Simpson (10/) | 48/3 | –3d. | 5.2 |
| 33/9 | 22/7½ | International Combus (5/) | 24/10½ | –10½d. | 5.9 | | | | | | |
| | | **IRON AND STEEL** | | | | | | | | | |
| 43/6 | 25/7½ | Brown Bayley (10/) | 37/6 | +9d. | 4.2 | 42/- | 22/7½ | South Durham Steel (£1) | 23/1½ | –2/1½ | 8.7 |
| 81/3 | 49/- | Colvilles (£1) | 50/1½ | –9d. | 6.4 | 47/8¼d. | 30/1½ | Steel Co. of Wales (£1) | 30/1½ | –1/- | 8.2 |
| 32/3 | 17/1½ | Consett Iron (£1) | 17/1½ | –4/- | ... | 57/4½ | 36/7½ | Stewarts & Lloyds (£1) | 37/4½ | –1/3 | 7.9 |
| 43/7½ | 23/4½ | Dorman Long (£1) | 23/4½ | –1/3 | 8.4 | 68/7½ | 42/1½ | John Summers (£1) | 43/1½ | –1/- | 7.0 |
| 55/1½ | 37/- | Firth & Brown (£1) | 43/9 | +2/3 | 5.8 | 55/7½ | 38/- | United Steel Cos. (£1) | 39/1½ | –2/6 | 6.3 |
| 49/10½ | 31/1½ | Lancashire Steel (£1) | 32/6 | –1½d. | 6.6 | 63/6 | 46/- | Whitehead Iron & Steel (£1) | 46/- | –1/- | 6.4 |

The companies whose share prices are quoted in the Engineering table and which form the basis of the Index give a balanced and comprehensive study of the engineering industry. Prices quoted are those at the start of the week. Due adjustments for Rights and Scrip issues are made. The Index figure is calculated on a National Cash Register Company computer. Prices in the Iron and Steel sections are not included in the Index.

# Five firms form joint subsidiary

FIVE companies, whose works and offices are spread from Southampton to Inverness-shire, have combined to form a joint subsidiary offering an integrated service of cleaning and coating for metal surfaces on site.

The new company is Site Shotblasting and Painting. Through the Birmingham company, R. J. Richardson and Sons, painting contractors and a paint manufacturer, Site Shotblasting are able to draw on a total labour force of 2,000 men.

## Mobile units

Provision is being made for the mobile units of the service, which are based on Richardson's shotblast units of two seven-ton trucks with trailers carrying shotblasting equipment, air compressors, dust extraction and recovery plant, and motor driven generating capacity, to operate overseas where shotblasting on site is required.

Partners in the new subsidiary are; the shotblasting division of R. J. Richardson and Sons, Abbott of Harrow, of Harrow and Southampton, Arnold Sharrocks, of Rochdale and Liverpool, W. C. Simpson and Son, of Edinburgh and Fort William, Inverness-shire, all painting contractors, and John S. Craig, of Glasgow, paint manufacturers.

## NEW Companies

**Dormston Manufacturing and Supply Co. Ltd.,** Dormston Industrial Centre, Burton Road, Dudley, Worcs. To carry on the business of manufacturers and dealers in machines and machinery generally. Nominal capital £100.

**M.T.C.H. Ltd.,** 268 Church Road, Iver Heath, Bucks. To carry on the business of plant and machinery hirers. Nominal capital £500.

**Regent Refining Co. Ltd.** To carry on the business of refiners, and petrochemists. Nominal capital £1,000. Registered by solicitors; Lovell White & King, EC4.

**Teknequip Ltd.** The offices of Price and Bailey, Aylmer House, Link Way, The High, Harlow. To carry on the business of mechanical and general engineers. Nominal capital £100.

**These particulars are selected from the daily Jordan's Register, published by Jordan & Sons Ltd., 116 Chancery Lane, London, W.C.2.**

# Market sentiment upset by steel news

## WEEK IN THE CITY

BY OUR CITY EDITOR

ALREADY none too robust, stock market sentiment was upset last week by some adverse company news from the steel industry. The decline in United Steel's profits was rather steeper than had been expected, and there was an unpleasant shock in the decision by Consett not to pay an interim dividend.

In some cases, the steel results have been less unsatisfactory than had been feared. John Summers, about which there had been a good deal of apprehension in market circles, is not, after all, cutting its dividend, and the decline in the group's profits proves to have been no more than moderate.

Background to the steel profit figures is the falling away in the volume of production in the latter part of the 1960-61 financial year, and continued pressure on profit margins. The steel companies have been unable to offset higher costs by increases in prices.

With the industry in general still working below capacity, the current financial year (to September 30 next) cannot have begun very well, and it will be interesting to read the comments of the chairmen on the present position and prospects. The uncertainties are reflected in the yields on steel shares, which now range up to about 8½ per cent.

## Aircraft shares up

No clear pattern has emerged from engineering share movements, though the section has not been without its firm features. Aircraft shares moved up quite sharply at the end of last week, and there was a good deal of speculative activity in Handley Page, despite the denials of a link-up with the British Aircraft Corporation.

Buoyant activity in the machine tool trades has been reflected in the results of Coventry Gauge & Tool, and of F. Pratt Engineering, specialists in lathe chucks. Group profits of Coventry Gauge in the year to August 31 were a record £896,000, almost double the figure for 1959-60, while Pratt's earnings were also well up at £287,000, before tax.

Pratt is paying a total dividend of 20 per cent, as forecast, but Coventry Gauge is paying rather more than the minimum forecast at the time of the one-for-four rights issue last January. The dividend, payable on the increased capital, is raised from the equivalent of 7½ per cent to 8¾ per cent tax free, with cover of 2.8 times, and the yield works out at about 4.6 per cent gross.

## Shock decision

Bright side Engineering is paying a maintained 20 per cent dividend from slightly lower profits, but there was a shock in the decision by Arthur Lee, makers of special steels, to cut the bonus with the final dividend from 2½ per cent to 1 per cent. This has the effect of reducing the total distribution for the year to September 30 last from 13½ per cent to 12 per cent.

Profits before tax have fallen by just over 20 per cent, from £1,656,000 to £1,317,000, but earnings are still equivalent to about 32½ per cent on the ordinary share capital. The cut in the bonus suggests that the directors cannot be too confident about the financial outcome by the current year.

# 'BRITAIN SCRAPES THROUGH'

FROM cars to pots and pans, British goods which have made no concession to the user, litter the markets of the world.

Mr. Roger Falk, a director of Production-Engineering, the management consultants, put this uncompromising view to the Royal Society of Arts in London last week in the last of a series of three lectures on British export trade.

## Design needed

"The wonder is that the world has put up for so long with so much of our stuff", said Mr. Falk.

"The pity is that it will not put up with it for much longer unless a real effort is made to design what people need and not what we think they ought to have."

Four marketing elements were described by Mr. Falk as essential to successful selling. They were: sound market research; economic and effective distribution channels; after-sales service; promotion.

# REFRIGERATOR EXPORTS UP

DEVELOPMENTS in the manufacture of British domestic refrigerators should please the Chancellor of the Exchequer, home sales are falling while exports show a modest improvement.

Home market deliveries of refrigerators in October were 26,098, a fall of 18.6 per cent from the number leaving the factories in October, 1960.

In the first ten months of the year deliveries were 744,450, a reduction of almost 14 per cent on the 864,643 refrigerators delivered in the ten months to the end of October, 1960.

For the first time since last January, exports picked up in October. Overseas markets received 8,457 refrigerators, an increase of six per cent on the 7,974 exported in October, 1960.

# Tidal power: after capital outlay only small costs

**THE greatest problem about tidal power is its intermittent nature—a single-basin scheme giving an intermittent supply of power varying considerably over the operating period. Since high water occurs 50 minutes later each day, power will be available by this amount later each day, which is an obvious disadvantage. Tidal range, or the head of water provided by a tide, shows wide variation; at spring tides it is nearly twice that at neap tides, the energy output at spring tides being nearly three times than at neaps.**

by
ROLT HAMMOND
ACGI, AMICE

In the proposed Severn Barrage, for example, this ratio is 3½ to 1. It is clear that it could not be used for public power supply — possibly the main reason why tidal power has not yet been developed on a large scale.

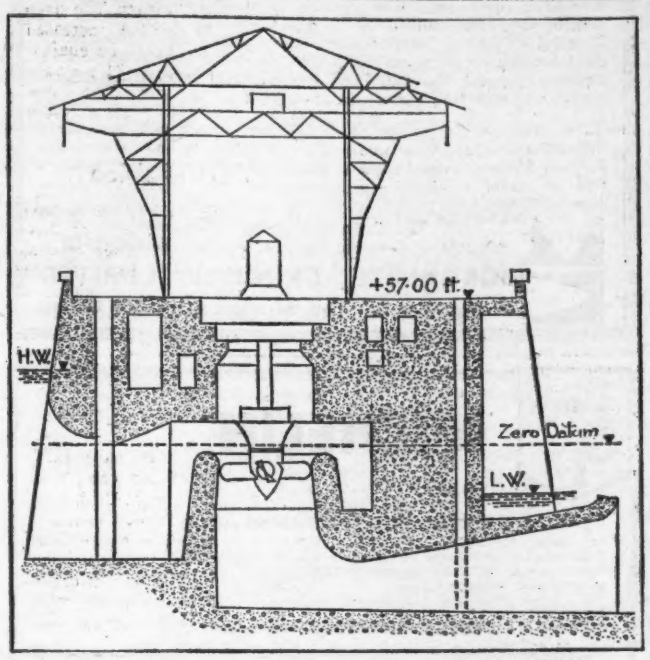



**FIG. 2 — Cross-section through one of the Kaplan turbines proposed for the Severn Barrage; the nominal output would be 35,000 h.p. The full output of the station would be 800 MW.**

Detailed study has been devoted to various schemes for regulating output from tidal power, one being a two-basin system as suggested for the proposed Menai Straits development.

In this case, the sluices of both basins are directly connected with the tideway; as the tide rises, the upper basin is filled through the inlet sluices.

The lower basin, previously emptied on the falling tide, will remain empty; at the turn of the tide, water will pass from the upper basin through the turbines to the lower basin and power will thus be generated.

In the double-basin system, constant and continuous output is maintained by suitable adjustment of the turbine valves to suit the head of water under which the turbines are operating.

Although this particular system will regulate output of power on an individual tide, it still leaves unsolved the problem of the great difference in output between spring and neap tides.

A possible answer is to combine two or more tidal power schemes, through a high-voltage transmission network, from sites which have the necessary difference in the time at which high water occurs every day, so that between them they will provide a regulated output.

These desirable conditions are extremely difficult to find, and still this scheme does not solve the problem of the great difference in output between spring and neap tides.

There are many conventional hydro-electric schemes — in Switzerland, for example — in which pumped storage is used for regulating output, a system which was considered for the proposed Severn Barrage.

In this system, any surplus power from a tidal generating station is used to pump water from a low-level reservoir — in this case the sea—to a high-level reservoir, water being drawn from the latter to generate power during those times when the tide is not operating, passing through the turbines to sea level.

Although this method certainly does provide complete regulation, it is very expensive.

## Combined system

It has been suggested that a tidal power scheme can be combined with a hydro-electric station to give a regulated output, but in this case success will hinge on the ability of the hydro-electric station to store enough water so that it can supply power during those periods when the tidal power plant is not working.

This basic principle, however, is applicable where a tidal power station can feed its output into an existing grid system, such as that of the Central Electricity Generating Board.

In this case, whenever tidal power is available, output of the steam stations would be reduced to that extent. This would save fuel and reduce wear and tear on the steam plant, but it would be essential to have steam stations of the same capacity as that of the tidal power plant, which means that the overall cost of power from such a scheme is high.

Yet tidal power has many advantages. The output of a tidal power station can be foretold with absolute accuracy for a long time ahead, simply because it depends upon the height of the tides.

Although these may be affected by winds and floods, the rise and fall for some sites are given in published tide tables.

Tidal power, unlike that produced from oil and coal, resembles hydro-electric power in being a non-wasting asset; after the capital cost of a tidal power station has been paid off, the cost per unit of power generated will be very low.

The most notable scheme for tidal power development in this country is the proposed Severn Barrage, first proposed in 1849; this was followed by a further proposal in 1918.

In 1947 the governmenf sanctioned a tidal model investigation undertaken by the Hydraulics Research Organisation under Sir Claude Inglis.

This is a single-basin scheme, its layout being shown in Fig. 1. At the start of operation, the head on the turbines is 47 feet, and when the station is closed down the head is only about 7 feet.

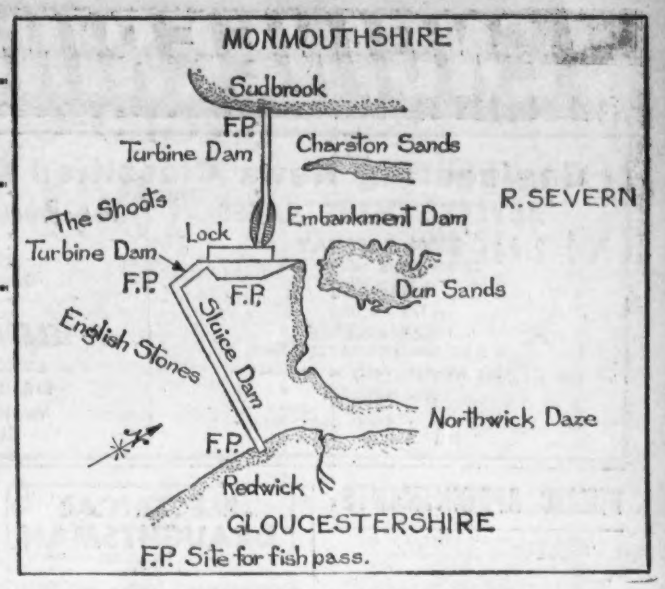



**FIG. 1 — Layout of proposed Severn Barrage.**

At this point the tide will be rising in the estuary and the gates in the sluice dam will be opened when the water level is the same on both sides; at high water the sluice gates will be closed and the cycle will start all over again, beginning 50 minutes later each day.

Fig. 2 shows a cross section through one of the Kaplan type turbines, each of 35,000 horsepower, designed by Dr. Seewer; 32 of these generating units would give a total output of 800 MW.

This is a propeller type of turbine, very suitable for tidal power generation because the angle of the blades is altered to give maximum efficiency while the water is falling.

The Rance scheme in France is another outstanding proposal, Fig. 3 showing a section through the special type of turbine designed for this.

The proposed scheme will take the form of a barrage across the estuary of the Rance, There will be 38 turbine units with a peak output of 342 MW.

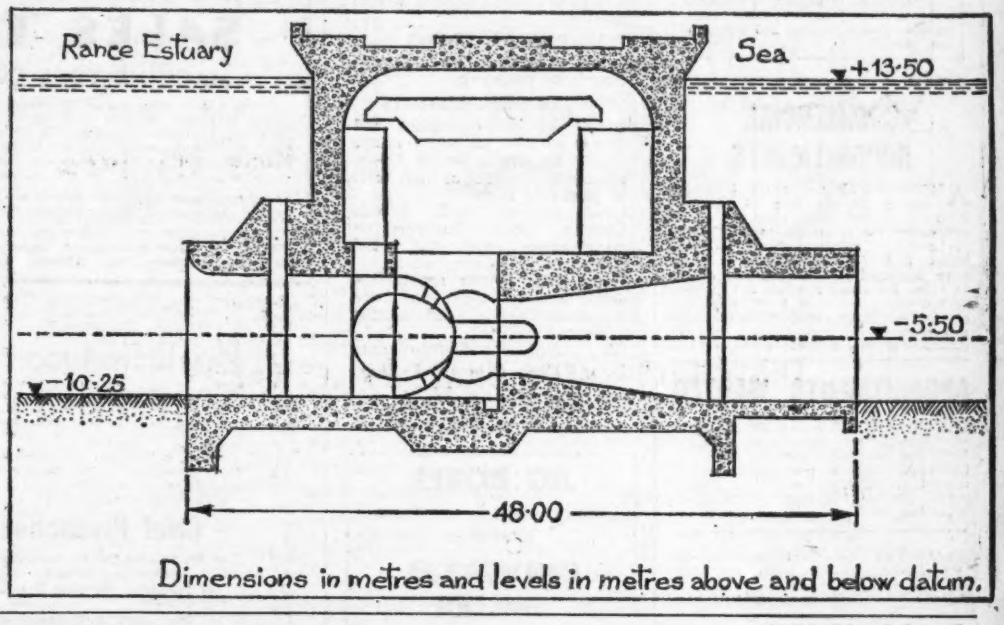



**FIG. 3 — Special type of turbine developed for the Rance tidal power scheme.**

# POWDER CUTTING HELPS TO MEET THE DEMAND FOR STAINLESS STEEL

POWDER cutting, which uses a finely divided iron-rich powder added to oxygen streams of a cutting blowpipe, has revolutionised stainless steel manufacturing and so helped to meet the growing demand for this material.

Before the powder process was introduced, cutting and shaping of stainless steel were generally carried out by mechanical methods, such as planing and drilling.

These were slow and expensive and added considerably to the cost of an already high-priced metal.

Stainless steel and non-ferrous materials cannot be cut by the normal oxygen technique because the melting point of the oxide produced is higher than that of the metal being cut. This results in the formation of an oxide layer which prevents the cutting oxygen stream from reaching the underlying metal.

The powder increases the reaction temperature and also acts as a flux, thus creating the conditions necessary to cut a wide variety of metals which are resistant to ordinary oxygen cutting.

The powder is carried from a dispenser through a rubber hose to the cutting nozzle in a stream of compressed air or nitrogen. The powder dispenser is designed to maintain a constant flow in all types of operating conditions.

Most dispensers are of the injector type. They are essentially pressure vessels, incorporating a hopper, air filter, air pressure regulator, dryer, and injector unit.

Standard oxygen cutting equipment can be easily adapted. All that is required is the installation of a dispenser and an appropriate cutting attachment.

British Oxygen makes two types of attachment — the single and multi-jet units. The former is suitable for straight line cutting of stainless steels and for "flying starts" below ignition temperatures.

The multi-jet unit, used for hand cutting and for machine profile, straight and bevel cutting, has a nozzle adapter which fits over a standard cutting nozzle.

A ring of ports in the adapter encircles the cutting nozzle and feeds powder into the oxygen stream.

Powder cutting nozzles are specially designed to produce a high velocity parallel cutting stream and a soft pre-heat flame. This allows the injected powder to be used to best advantage, speeds cutting, produces a narrower cut, and results in a high quality finish.

The operational cost of powder cutting is not much greater than that of conventional oxygen cutting.

Success with non-ferrous metals depends largely on the chemical composition of the material being cut. With cast iron, for instance, cutting speeds may be slower than with stainless steel. Higher alloy steels generally take longer to cut than average stainless steel.

Copper and its alloys are usually hand cut, and the best results are obtained by using a large cutting nozzle at low cutting oxygen pressure to avoid the chilling effect of a high velocity jet.

A powder cutting blowpipe capable of cutting 9-in. thick stainless steel can deal with copper up to 1in. and bronze and brass up to 4in.

With nickel and most nickel alloys, which have a high melting point, a modified technique and considerable pre-heating is necessary.

Cutting of aluminium alloys has been less successful than with most other widely used non-ferrous metals.

The success of the powder technique in cutting has led to its adoption for a variety of other oxygen/fuel gas processes, including gouging, lancing, and deseaming.

**Use of stainless steel in the U.K. has grown rapidly in recent years, particularly in the chemical and food processing fields where corrosion resistance and cleanliness are vital factors. Here a copper beer vat is being powder cut at a London brewery.**

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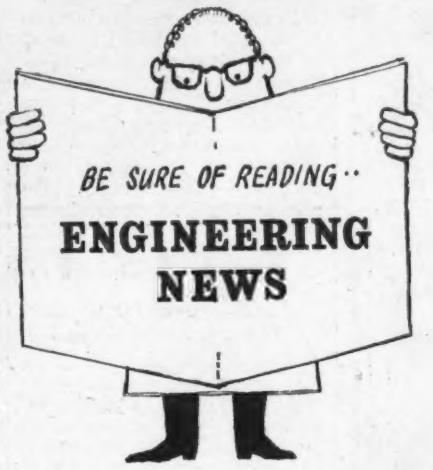


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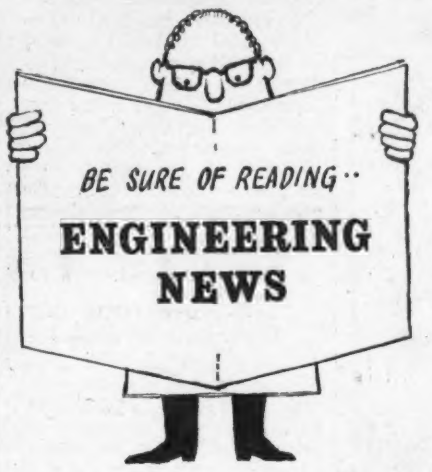


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# TWIN-FINISH PLANT FOR ALUMINIUM

## *Automatic chemical polishing and anodising cut alloy cost*

AN important addition to the recently opened London Aluminium Co. factory at Wombourn near Wolverhampton is the automatic chemical polishing and anodising plant installed by Albright and Wilson (Mfg.).

With a total output of thousands of square feet of finished aluminium per day the two complete processes of Phosbrite 159 chemical polishing and sulphuric acid anodising are coupled together.

They provide the final lustre and protective surface for a variety of components ranging from car radiator grilles to bobbins for the textile industry and reflectors for street lighting.

The treatment cycle starts with three stages of alkali soak, followed by a cold water rinse, nitric acid de-smut and a hot water rinse.

The components are then chemically polished in Phosbrite 159, fine control being arranged by means of a delayed set-down mechanism. After a further hot water rinse, nitric acid de-smut, and two cold rinses, anodising is carried out at a current density of 14 amps. per sq. ft.

This is followed by two more cold rinses before the final hot water seal. The racks then pass through a hot air dryer prior to arriving at the unloading station.

There are two points in the cycle where the work can drain and also be inspected.

The plant is designed for a varied output and immersion time at any station can be set for periods up to five minutes.

—by—
**Engineering News staffman**
**G. P. JEWELL**

Careful selection of materials was needed for its construction, and stainless steel was used for the polishing, nitric acid, and hot water tanks. The anodising tank is rubber lined steel and fume removal ducts are made from p.v.c.

### Chilled water

Special features include the supply of d.c. current from a separately housed rectifier with remote control from a panel near the load/unload station.

Temperature control of the anodising bath is maintained thermostatically by regulation of the flow of chilled water through external heat exchangers of the high efficiency carbon block type.

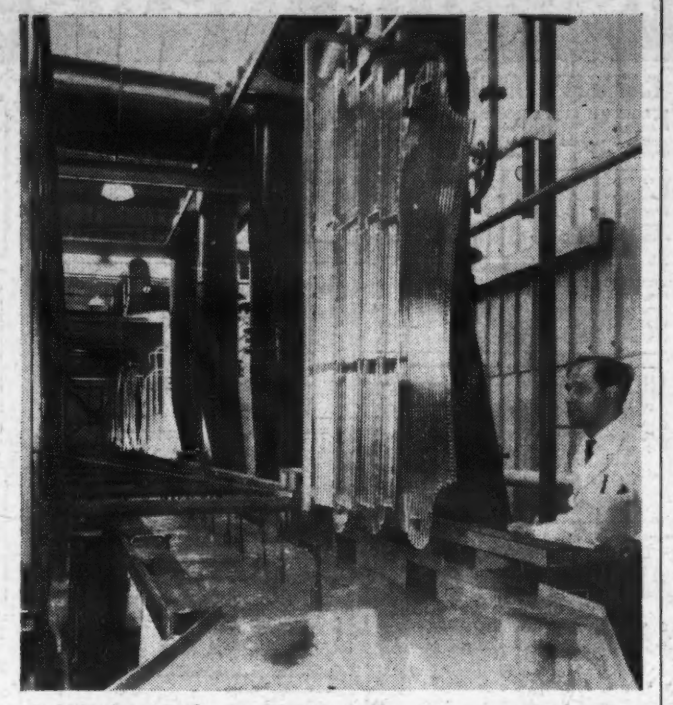
Chilled water supplied to them is controlled within 6 deg. F by using multiple refrigeration condensing units which are switched in and out according to the load required at the heat exchangers.

The chairman of the company, Major C. R. Dibben, explained that much research on finishing processes had been carried out, and they held a licence for the German Erftwerke process, while the Brytal process was used for their tableware.

### Overseas orders

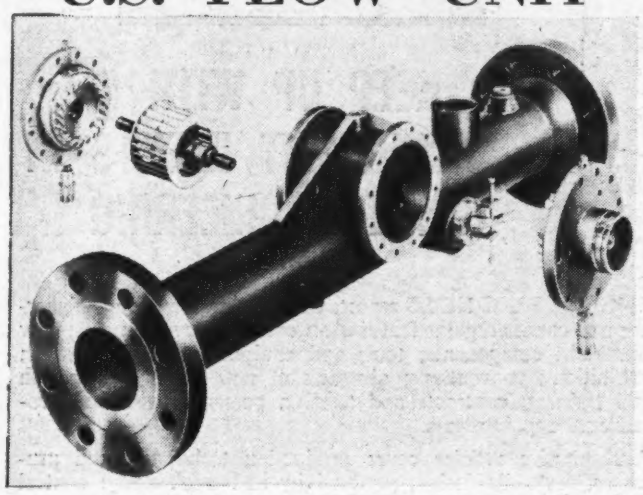
However, the process used in the automatic plant permitted the use of lower priced high-purity alloys, and made it possible to compete with chrome plated brass and steel.

"We are already supplying large quantities of trim to Ford Motor Co., Germany," he concluded, "and encouraging inquiries have been received from Sweden and other continental countries. If and when we enter the Common Market there will be outlets for greatly increased sales and considerable developments".



**Chemically polished and anodised radiator grilles leave the multi-station anodising plant prior to rinsing and hot water sealing. Note the rubber lined anodising tank with fitted lead cathodes**

# BRITAIN MAKES U.S. FLOW UNIT



FLOWMETERS for volumetric and mass flow measurement of liquids and gases are being manufactured by Rotron Controls, of Rochester, Kent.

The company was formed this year as a joint subsidiary of Elliott Bros. (London) and Rotron Controls Corp., of Woodstock, U.S.A.

Know as Vortex-Velocity flowmeters, they have been manufactured by the American company for a number of years and are claimed to have established a reputation for accuracy and reliability.

The British company will market the Rotron range of flowmetering equipment throughout Europe, the Commonwealth (except Canada), and the Middle East.

### Magnets mated

The flowmeters, as shown in the exploded picture, consist of a cylindrical vortex chamber, welded at right angles to a main flow tube, with its axis displaced.

A rotor is mounted within the chamber which rotates with the vortex.

Cylindrical magnets mounted on both ends of the rotor shaft transmit its rotation through a pressure type non-magnetic hub to a mating external magnet on the required measurement device.

Vortex chamber end plates are fitted with interchangeable vane plates to control the shunt flow of fluid passing axially into both ends of the rotor.

The Rotron flowmeter is an in-line unit for insertion between flanges of a main pipe.

# Agricultural college to open at Silsoe

A NATIONAL College of Agricultural Engineering is to be set up, at Silsoe, in Bedfordshire.

"We are at the start of a unique venture which has every chance of being of immense benefit to the industry of this country and also to many countries overseas," said Sir Gilbert Flemming, chairman of the Governors of the college, in London earlier this week.

Sir Gilbert, giving details of the first of the new college's three-year courses to start next autumn, said the college was meant to help industry in this country to extend and improve its manufacture and export of agricultural engineering products.

It would also send out well-qualified students not only into the manufacturing industry, but also into other responsible posts in which they could forward the development of mechanised agriculture.

"The industry is not frightened that this country may soon enter the European Common Market," said Sir Gilbert. "Forty per cent of its exports already go to Europe; or taking only those European countries that are in the Common Market the proportion is 14 per cent and the value for 1960 about £18 million.

### Sheet anchor

Dr. P. C. J. Payne, the first principal of the college, said: "Associateship of the college is intended to provide the 'sheet anchor' by which the college will set its standards.

He added that the course was not confined to the problems of temperate countries, because he believed that the college could make an important contribution to the agriculture of the underdeveloped countries of the Commonwealth and elsewhere, particularly by training men to work in them.

Until the college buildings at Silsoe are completed the courses will be at the Mechanised Farming Centre, Boreham, near Chelmsford, Essex, made available by the Ford Motor Co.

### Limited number

Owing to the limited accommodation available at Boreham, not more than 20 students can be accepted into this first year, but by the autumn of 1963, when the new college premises will be open, residential accommodation will be available for 100 students.

The new course will lead to the award of the College Associateship. In the first year they will study engineering and agriculture as separate disciplines. In the second year, studies of engineering will incline directly towards the requirements of agricultural engineering. In the third year the analytical approach to the technology of agricultural engineering will occupy more than threequarters of the time.

The college will have close relationship with the National Institute of Agricultural Engineering, which is also at Silsoe.

# *FIRE-TANKER AT SEA AGAIN*

AFTER being severely damaged by fire in July of last year, the super-tanker "Esso Portsmouth" left the Tyne last Thursday fitted with a new mid-ship section which has made her 40 feet longer.

The decision to lengthen the ship was made when work started on cutting out the centre section in the drydock at Swan, Hunter and Wigham Richardson's Yard.

It was found that the forward and after ends could be salvaged.

In the meantime, the new section was built at the Walker Naval Yard at Vickers Armstrongs.

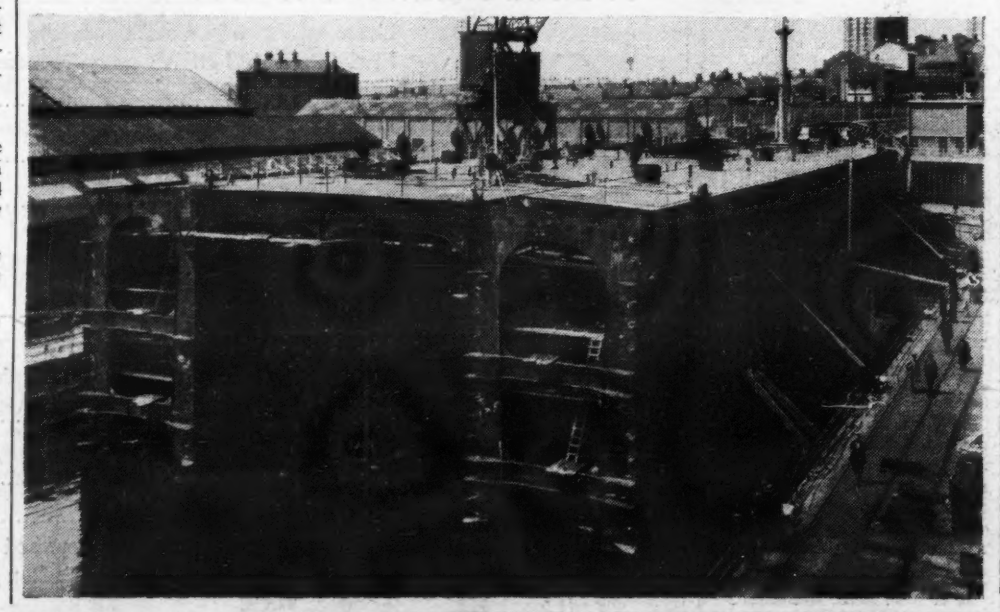
When ready for joining, the drydock and the forward part of the vessel were flooded and the redundant middle section, together with the after end, floated out.

After pumping the dock dry, the keel blocks were aligned to give all three sections a level base. Then the dock was flooded once more and the new centre section towed in, followed by the old after end.

A delicate lining up operation then took place.

Only after checking and rechecking was the final joining up operation undertaken, an effort which has added an extra cargo tank to the ship and increased her deadweight from 36,040 to 37,713 tons.

**The new mid-section prior to the joining-up operation.**



## LATE NEWS

**TEMple Bar 3422**

**The basic prices of wrought titanium are being cut by Imperial Chemical Industries' Metals Division. ICI's price cuts, applying to deliveries after January 1, 1962, average between 10 and 15 per cent, varying according to form and alloy. Other titanium price cuts are shown on page 16.**

## Drill rig

● from front page

The output from the engine is to a Triple Deri-Syne Hydraulic pump through a Renold chain coupling. These pumps operate in parallel and give a system pressure of 1,750 lb./sq. in., for the operation of the mast positioning cylinders, drill rotation motor and self propelling mechanism.

A rotary "power vane" compressor is towed behind the drill to provide air power for the in-the-hole hammer and for air flushing.

The drill frame is carried on two Bristol crawler tracks which have 10in. pads at 5ft. centres, the overall length of the tracks being 8ft. 3in.

These tracks are operated by a hydraulic motor, driving through a Croft totally enclosed torque arm reduction gear box, the drive shafting being carried in a ball bearing pillow block.

A strap brake is provided on each track and to enable the drill to manoeuvre into position over rough terrain, an 8in. rise and fall in each track is obtained by articulation, actuated through the transverse swivel axle.

The drill uses block and tackle principle for the thrust mechanism in which a hydraulic cylinder and piston, with a working stroke of 5ft. 6in. is used with a pulley system having a velocity ratio of 2.

## Mountbatten: 'reorganise air designers'

EARL MOUNTBATTEN, Chief of the Defence Staff, speaking at a luncheon of the Air League of the British Empire in London last week advocated a reorganisation of Britain's teams of aircraft designers.

He said that as aircraft became more complex and thus more expensive, fewer of them could be afforded. This in turn meant they would be required to fulfil more and more roles and this would make them yet more complex.

There is thus a real danger of a "vicious spiral leading inevitably to too many eggs in one superlatively finished and impossibly expensive basket", he said.

This can be avoided by "the service staffs striking the balance between a multiplicity of types, no one of which is really flexible and too few types, each of which is superlative but where the loss of a dozen aircraft might completely frustrate an operation".

The lesson to the aircraft industry is equally plain, he said. "There will not in future be enough different types to give work to the large number of separate design teams now in existence."

The alternatives are "either to cut up the work among the present number of teams, or as I should have thought better, disband selected teams and strengthen the remainder. This, no doubt, is already receiving urgent attention."

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